



## RISK FACTORS FOR ARTERIAL HYPERTENSION IN YOUNG AGES

1. Orziqulova Sh. A.

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<sup>1</sup> Department of Internal Medicine Bukhara State Medical Institute named after Abu Ali ibn Sina

**Abstract:** Arterial hypertension (AH) is recognized as one of the most common diseases in the world. The presence of elevated blood pressure in youth leads to increased cardiovascular mortality in middle age.

**Target:** to study the prevalence of hypertension and risk factors among healthy individuals aged 20 to 29 years.

**Materials and methods.** 981 relatively healthy young people (536 men and 445 women, average age 22,32,26 years) were examined and a one-time sample epidemiological study was conducted.±

**Results.** The prevalence of hypertension is 14.2%, significantly higher among men (22.2%) than among women (4.5%),  $p < 0.05$ . There is a high incidence of risk factors such as excess weight (35.4% of men), smoking (27.8% of men), hereditary predisposition to hypertension (57.8% of respondents), non-compliance with the daily routine (58.8% of respondents), as well as a significant reaction to stress (37.7% of respondents). Among people with hypertension, the prevalence of overweight, smoking, excess salt intake, hereditary predisposition, and physical inactivity is significantly higher.

**Conclusion.** The prevalence of hypertension among young people is 14.2%; the main risk factors for hypertension are found in more than a quarter of those examined.

**Key words:** arterial hypertension, risk factors, prevalence.

Arterial hypertension (AH) is recognized as one of the most common diseases in the world. According to some epidemiological studies, high blood pressure (BP) is detected in more than 40% of European residents and about a quarter of residents of the United States of America [1,2,3,4,5,6]. In this case, most often the objects of research are people over 40 years

of age, and often over 60 years of age, who have long suffered from hypertension, often complicated by myocardial infarction, rhythm and conduction disorders, heart failure, and who have a high cardiovascular risk. While the category of young patients suffering from hypertension or having risk factors for its development, as a rule, remain beyond the

attention of researchers. However, according to some studies, in particular the large-scale Harvard Alumni Health Study (HAHS) [7,8,9], the presence of high blood pressure in youth led to an increase in cardiovascular mortality in middle age. In this regard, the purpose of our study was to study the prevalence of hypertension and risk factors in individuals aged 20 to 29 years who consider themselves healthy.

### Materials and research methods

981 relatively healthy young people were examined. All subjects underwent three blood pressure measurements, after which they filled out a questionnaire to identify risk factors for the development of hypertension. Blood pressure categories were determined according to current recommendations [10,11,12,13,14]. According to the blood pressure level, 2 groups were divided: group 1 (n=842) consisted of patients whose blood pressure level was within normal limits (below 140/90 mm Hg), group 2 (n=139) - patients with hypertension (BP 140/90 mmHg and above). Within Group 1, 2 subgroups were divided: 1a - those examined with a blood pressure level below 130/85 mm Hg. and 1b - with high normal blood pressure (130-139/85-89 mmHg). Body weight (BW) was considered overweight if the BMI index (BMI) exceeded 25 kg/m<sup>2</sup>. Salt intake was assessed as «I prefer food that is a little salty», «moderately salty» And «I get by with virtually no salt». The reaction to stress was determined by the answer to the question: «How susceptible are you to stress?» «to a large extent» or «I try to deal with stressful situations calmly». Statistical processing was carried out in a statistical package «MedStat». When checking the normality of distribution, the following criteria were used:  $\chi^2$ -square and W Shapiro-Wilk. To compare quantitative indicators for two groups, the Wilcoxon W test was used; when comparing more than two groups, one-way analysis of variance, Dunn's test, and Kruskal-Wallis one-way rank analysis were used. Fisher's angular transformation was used to calculate the 95% confidence interval (CI). To

compare groups according to qualitative criteria, the criterion was used  $\chi^2$ -square and angular Fisher transformation with Yates correction. Data were presented as median (25% quartile; 75% quartile). Differences were considered statistically significant at a significance level of  $p < 0.05$ .

### Research results and discussion

536 men and 445 women were examined, the average age was 22.3  $\pm$  2.26 years. Among the examined, normal blood pressure was observed in 842 (85.8%, 95% CI 83.6-87.9%), hypertension was registered in 139 (14.2%, 95% CI 12.1-16.4%) people. Among those examined with normal blood pressure, optimal blood pressure was detected in 299 people (30.5%), high normal blood pressure - in 134 (13.7%). The examinees who had normal blood pressure made up group 1, which was divided into 2 subgroups: 1a (BP below 130/85 mm Hg) - 708 people (84.1%, 95% CI 81.5-86.5%), and 1b (BP 130-139/85-89 mmHg) - 134 (15.9%, 95% CI 13.5-18.5%). Those examined with hypertension comprised group 2, of which 115 people (82.7%) suffered from grade 1 hypertension, 20 (14.5) from grade 2, and 4 (2.8%) from grade 3. In group 1, the average level of blood pressure was 116.7 (110;120) mm Hg, blood pressure was 75 (70;80) mm Hg, heart rate was 75 (69.7;80) beats per minute, in subgroup 1a - 113.3 (108.3;120) mmHg, 71.7 (70;80) mmHg, 74.7 (69.7;80) beats per minute, in subgroup 1b - 130 (123.3;130) mmHg, 83.3 (80;85) mmHg, 77 (70.3;80) beats per minute, in group 2 - 140 (135;144) mmHg, 90 (90;93.3) mmHg, 77.3 (68.3;85.7) beats per minute, respectively. At the same time, heart rate did not differ significantly between the groups ( $p > 0.05$ ). The incidence of hypertension and high normal pressure was significantly higher among men than among women ( $p < 0.05$ ). Thus, hypertension was detected in 119 men (22.2%, 95% CI 18.8-25.8%) and 20 (4.5%, 95% CI 2.8-6.6%). As can be seen from the results of the analysis of the contingency table, the examined groups 1 and 2 differed significantly in gender distribution. In group 1, the number

of men and women was almost equal, in the second group there was a significant predominance of male patients. At the same time, the subgroup of those examined with high normal blood pressure did not differ from group 2 on this basis, and significant differences were revealed between subgroups 1a and 1b. Excess body weight (BMI>25) was detected in 230 subjects (23.4%, 95% CI 20.8-26.1%). In men this figure was significantly higher 190 (35.4%, 95% CI 31.5-39.5%) than in women 40 (9.0%, 95% CI 6.5-11.8%),  $p<0.001$ . The prevalence of excess weight gain was significantly higher in group 2 compared to group 1. Moreover, in subgroup 1b it is significantly higher than in subgroup 1a, and in group 2 it is significantly higher than in subgroup 1b. The average BMI was 22.32 (20.11; 24.91) kg/m<sup>2</sup>, and significant differences in BMI were observed among subjects of different sexes: for men 24.10 (21.60; 26.63) kg/m<sup>2</sup>, for women 20.53 (19.10; 22.60) kg/m<sup>2</sup>,  $p<0.001$ . In those examined with normal blood pressure, BMI was significantly lower 21.97 (20.06; 24.30) kg/m<sup>2</sup> than in 2 - 26.78 (21.60; 31.02) kg/m<sup>2</sup> ( $p<0.001$ ). In subgroup 1b, BMI (24.45 (21.46; 26.57) kg/m<sup>2</sup>) was significantly higher than in subgroup 1a (21.60 (19.84; 23.80) kg/m<sup>2</sup>,  $p<0.001$ ), and did not differ significantly from the indicator of group 2 ( $p>0.05$ ). At the same time, a positive correlation between BMI and both the level of blood pressure ( $R=0.408$ ,  $p<0.01$ ) and the level of blood pressure ( $R=0.419$ ,  $p<0.01$ ) was revealed. The prevalence of smoking among the surveyed was 187 people (19.1%, 95% CI 16.7-21.6), 155 people (15.8%, 95% CI 13.6-18.1) had a history of smoking. Among men, the prevalence of smoking was 149 (27.8%, 95% CI 24.1-31.7%), among women 38 (8.5%, 95% CI 6.1-11.3%), which was significantly less ( $p<0.001$ ). There were no significant differences in the prevalence of smoking between those examined who had normal blood pressure and hypertension levels ( $p>0.05$ ). The number of cigarettes smoked per day in group 1 was significantly less - 10 (5;15) pcs., than in group 2 - 13.5 (10;20) pcs. ( $p<0.001$ ). The

duration of smoking in group 1 was also significantly shorter—5 (4;5) years—than in group 2—6.5 (5;8.5) years,  $p<0.001$ . When subgroup 1b and group 2 were combined and the prevalence of smoking was compared with subgroup 1a, a significantly higher prevalence of smoking was found in the combined group ( $\chi^2=11.21$ ,  $p<0.001$ ). 478 (48.7%, 95% CI 45.6-51.9%) of the subjects drank alcohol. There were no differences in the prevalence of alcohol use depending on gender ( $p = 0.232$ ): among men this figure was 271 (50.6%, 95% CI 46.3-54.8%), among women 207 (46.5 %, 95% CI 41.9-51.2%). When analyzing the prevalence of alcohol consumption among people with different blood pressure levels, no significant differences were also found ( $p = 0.889$ ). Also, no significant differences were found between the groups in the type of alcoholic beverages consumed: in group 1, 238 people (28.3%) drank mainly beer, 129 (15.3%) wine, 42 (5.0%) spirits.; in group 2 - 50 (36.0%) drank beer, wine - 15 (10.8%), spirits - 4 (2.9%), ( $\chi^2=5.11$ ,  $p=0.078$ ). The frequency of alcohol consumption also did not differ significantly between groups ( $p = 0.396$ ) and averaged 1 drink/week. However, in group 2, there was a significantly higher amount of alcohol consumed per week - 3.75 (2; 7.5) units compared to group 1 - 2.5 (1.25; 5.0) units ( $p<0.001$ ). We analyzed the respondents' subjective assessment of salt consumption. Preferred to use<<somewhat oversalted>>133 (13.6%) of those examined, 706 (72.0%) preferred food<<moderately salty>>food, 142 (14.5%)<<got by with virtually no salt>>. At the same time, a significantly greater predisposition to eating salty foods was revealed among men than among women ( $p = 0.005$ ). Among men, food preferences were distributed as 114 (21.3%), 368 (68.7%) and 54 (10.1%); among women - 45 (10.1%), 288 (64.7%) and 112 (25.2%), respectively. As can be seen from Table 1, among people suffering from hypertension, there is a significantly more frequent consumption of salty foods than among those examined with normal blood pressure levels. Hereditary predisposition to hypertension was observed in 567 cases

(57.8%, 95% CI 54.7-60.9%). The prevalence of hereditary predisposition was almost the same among both males 296 (55.2%, 95% CI 51.0-59.4%) and females - 271 (60.9%, 95% CI 56.3 -65.4%),  $p=0.084$ . Thus, among patients suffering from hypertension, the prevalence of hereditary predisposition is significantly higher than in group 1, and the analysis of subgroups of group 1 reveals a tendency for a higher prevalence of hereditary predisposition to hypertension among those examined with registered high normal blood pressure. 249 subjects (25.4%) performed regular physical activity, 59 (6.0%) went in for sports professionally, 103 (10.5%) did not exercise at all, and did physical exercise from time to time (570, 58.1%). ). No significant differences were found between men and women ( $p=0.105$ ). There is a significantly higher prevalence of complete lack of physical activity among people with hypertension compared with those examined with normal blood pressure levels. In the structure of physical activity, dynamic physical activity prevailed - 583 people (66.4%, 95% CI 63.2-69.5%). Among people with normal blood pressure, as in the general population, dynamic physical activity predominates, however, in patients suffering from hypertension, the frequency of static physical activity was significantly higher. At the same time, a tendency was revealed to increase the prevalence of static physical activity among people with high normal blood pressure. The average duration of walking per day among all respondents was 2 (1; 3) hours per day; no significant differences were found in groups with different blood pressure ( $p = 0.235$ ). At the same time, there is no correlation between the duration of walking per day and the level of both SBP and DBP ( $R_o=0$ ,  $p>0.05$ ). Non-compliance with the daily regimen was identified in 577 (58.8%, 95% CI 55.7-61.9%) respondents, and among women who did not comply with the regimen there were significantly more - 314 (70.6%, 95% CI 66.2 - 74.7) compared to men - 263 (49.1%, 95% CI 44.8-53.3%),  $p<0.001$ . Among individuals in group 2, the absence of a daily routine was observed statistically significantly less often

than among individuals with normal blood pressure. The average sleep duration was 7 (15; 19) hours; among men - 6.5 (6; 8), among women - 7 (16; 18). There were no significant differences in sleep duration between groups by gender and blood pressure level ( $p=0.055$ ,  $p=0.349$ , respectively). At the same time, there is no correlation between sleep duration and the level of both SBP ( $R_o=-0.031$ ) and DBP ( $R_o=-0.028$ ),  $p>0.05$ . A pronounced reaction to stress, according to the subjective assessment of the respondent, occurred in 370 respondents (37.7%, 95% CI 34.7-40.8%). Moreover, among women this reaction occurred significantly more often - 233 (52.4%, 95% CI 47.7-57.0%) than among men - 137 (25.6%, 95% CI 22.0-29.3%),  $p<0.001$ . There were no significant differences in the prevalence of severe stress reactions between groups with different BP levels (20,21,22).

### Conclusions:

1. Among young people, the prevalence of hypertension is 14.2%, while among men there is a significantly higher prevalence of hypertension (22.2%) than among women (4.5%).  
 $p<0.05$ .
1. The most common risk factors for hypertension among young people are excess weight gain (35.4% of men), smoking (27.8% of men), hereditary predisposition to hypertension (57.8% of respondents), non-compliance with the daily regimen (58.8 % of those surveyed), as well as a significant reaction to stress (37.7% of respondents).
2. The most significant risk factors for hypertension for young people are excess body weight, smoking, excess salt intake, hereditary predisposition, and physical inactivity.

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