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Research article

ASSESSMENT OF THE RISK OF DEVELOPING CARDIOVASCULAR PATHOLOGY IN MEDICAL UNIVERSITY STUDENTS

V.I. Popov, V.I. Bolotskih, A.V. Makeeva, A.I. Gubin, E.I. Anufrieva

Voronezh State Medical University named after N.N. Burdenko, 10 Studencheskaya St., Voronezh, 394036, Russian Federation

Diseases of the cardiovascular system (hypertension, coronary heart disease, and heart failure) occupy leading places in the overall pathology structure. A specific feature is a growing share of young people who suffer from cardiovascular diseases (CVDs) in the total population. This is facilitated by physical inactivity, unhealthy diets, elevated stress levels as well as genetic predisposition. Identification of leading risk factors at the latent stage can make for timely diagnostics of cardiovascular pathology in young people. This, in its turn, allows implementing relevant prevention as well as adjusting therapies thereby improving quality of life of each individual patient.

Given that, the aim of this study was to assess risk factors causing CVDs in medical university students; to determine severity of existing cardiovascular disorders as well as their relationships with factors that may have caused them. Eight hundred and seventeen students participated in the study. They all took part in a survey to identify risks of developing CVDs with certain adjustments made to an applied questionnaire to adapt it for use among students. Also, the study involved assessing basic anthropometric parameters (height, weight, and body mass index (BMI)), hypertension in family case history, physical activity, time spent with gadgets (use of smartphone), and alcohol consumption.

The study revealed that 30 % of the examined people had overweight; more than 54 % abused alcohol; 53 % of the respondents mentioned elevated stress levels. All this creates significantly elevated risks of cardiovascular diseases as well as their complications for young and middle-aged people. The study results clearly indicate elevated risks of cardiovascular pathology and this requires correction of risk factors at an early stage.

Keywords: cardiovascular diseases, leading risk factors, young age, stress, physical inactivity, genetic predisposition, smoking, alcohol.

In recent years, multiple studies have reported an increase in prevalence of cardiovascular pathologies among different age groups with unwaveringly growing mortality due to heart diseases and their complications. A distinct relationship is established between prevalence of risk factors that cause cardiovascular diseases (CVDs) and numbers of CVDs cases. Influence of behavioral factors on changes in a lifestyle and, consequently, on risks of CVDs has been given scientific evidence [1–3]. In particular, it is important to investigate significance of specific risk factors able to cause CVDs such as elevated neuro-psychic loads, unhealthy work and rest regime, alcohol consumption, smoking, overweight and others, including their combined effects. This will allow getting a better

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Valery I. Popov – corresponding member of the Russian Academy of Sciences, Doctor of Medical Sciences, Professor, Head of the Department of Common Hygiene (e-mail: 9038504004@mail.ru; tel.: +7 (473) 253-15-60; ORCID: <https://orcid.org/0000-0001-5386-9082>).

Vladimir I. Bolotskih – Doctor of Medical Sciences, Professor, Head of the Department of Pathological Physiology (e-mail: vibolotskih@vrngmu.ru; tel.: +7 (473) 253-14-12; ORCID: <https://orcid.org/0000-0001-6792-6359>).

Anna V. Makeeva – Candidate of Biological Sciences, Associate Professor at the Department of Pathological Physiology (e-mail: makeeva81@mail.ru; tel.: +7 (920) 210-19-44; ORCID: <https://orcid.org/0000-0002-4926-167X>).

Artem I. Gubin – Candidate of Medical Sciences, Assistant (e-mail: patfiz@vrngmu.ru; tel.: +7 (473) 253-14-12; ORCID: <https://orcid.org/0000-0002-4377-0553>).

Elena I. Anufrieva – Assistant at the Department of Pathological Physiology (e-mail: e.i.anufriyeva@yandex.ru; tel.: +7 (903) 858-78-67; ORCID: <https://orcid.org/0000-0001-8380-4765>).

insight into reasons for CVDs development, identifying distinct regularities and possible regional peculiarities of prevalence of risk factors [4–7]. It is extremely alerting that in recent years CVDs have started to occur in much younger age groups. Notably, there has been a substantial growth in a number of young patients with changes in the cardiac muscle, which are a signal of undiagnosed CVDs, as well as patients who have suffered myocardial infarction at an age younger than 40 years [2, 8–10]. Occurrence and a constant growth in CVDs cases in adolescents, youth, and the first period of a middle age, that is, in people younger than 35–40 years are associated not only with an unhealthy lifestyle but also with permanently increasing neuro-psychic loads.

The Internet, television, and various electronic gadgets are undoubtedly an irreplaceable part of our everyday life. Still, they bring huge flows of diverse information into a person's life, especially in young and middle age. Under such conditions, uncontrollable emotional overloads, suppressed emotions and stress can promote higher levels of catecholamines (adrenalin and noradrenalin) in blood and, consequently, lead to occurring unmotivated anxiety, agitation, and fear. As a rule, functional state of the cardiovascular system has a drastic response to changes in mood and this can lead to irreversible pathological impairments and CVDs development. Multiple research works can help adjust data on risk factors and optimize a system for CVDs prevention for young people. According to literature data, correction of lipid metabolism disorders, fighting against smoking, sanitation of infection foci, optimization of physical activity and a lifestyle as a whole have turned out to be the most significant for preventing CVDs and their complications [11, 12]. Diseases of the cardiovascular system, especially in

young patients, are often accompanied with impairments of the nervous system, which can have certain effect on a clinical course and outcome of a primary disease [13, 14]. Therefore, all this is a huge complex issue, both medical and social one, which requires a comprehensive approach and additional investigations.

The aim of this study was to assess risks of CVDs in medical university students, determine severity of existing cardiovascular disorders as well as establish their relationships with factors that may have caused them.

Materials and methods. We conducted an anonymous survey among students of various years and faculties who attended the Voronezh State Medical University named after N.N. Burdenko. Eight hundred and seventeen students, from the 1st to 5th year, participated in it. A questionnaire applied in the survey was based on a standard questionnaire for identifying hazards of CVDs [15] with certain adjustments to adapt it for use among students; namely, an age range was excluded, an age was given in figures, some so called trap questions were added to exclude students, who did not fill in the questionnaire conscientiously, from the data array for further analysis. Hazards of CVDs were assessed as per a total score sum according to the criteria describing a risk of cardiovascular pathology (Table 1). The obtained data were analyzed using several criteria: general data; data distributed as per a study year; analysis of Broca BM index (height – weight) to identify students with overweight; alcohol consumption; hypertension in family case history; susceptibility to stress or its actual occurrence; physical activity; diets; occurrence of various CVDs symptoms according to students' own subjective assessment. After excluding some forms, the total number of filled-in forms eligible for statistical analysis equaled 788.

Table 1

Criteria describing risks of cardiovascular diseases

CVDs hazard	Total score	Recommendations
High	46–59	You should contact your physician immediately to have a complex medical check-up and be prescribed a therapy.
Pronounced	31–45	Your health requires immediate medical correction. You should contact your physician to develop a suitable rehabilitation program.
Moderate	16–30	Your health is still in a fragile balance since it is being affected by harmful factors.
Absent	1–15	No hazards have been detected for your health. You successfully avoid any risk factors able to cause CVDs.

Statistical data obtained by the anonymous survey were analyzed and the most significant indicators were filled in relevant tables.

Results and discussion. All study results were divided into several conditional groups. The most indicative ones were selected out of 33 groups of questions and their main criteria include the following: data of CVDs risks and their analysis as per study years; dependence between CVDs risks and Broca body mass index, alcohol consumption and signs of stress. Each group was analyzed both separately and with regularities associated with combinations of different groups. Analysis of the total data array revealed that only 31 % of the respondents (249 students) had no risks of developing CVDs. Moderate risks were identified for 50 % of the respondents (397 students); pronounced risks, 17 % (131 students). High CVDs risks were identified for 2 % of the respondents (11 students) (Table 2). The most distressing was the fact that 49 % of the respondents (175 students) had moderate risks of developing CVDs already during their first study year and another 17 % (62 first-year students) had even pronounced CVDs risks. This might indicate that some changes in the cardiovascular system had occurred in those students when they had still been studying at school. Naturally, this is a very alerting and serious signal. It also

indicates that unfavorable risk factors that can cause CVDs had previously been present in students' life and significantly affected their health. Our analysis of data on CVDs risks as per study years did not reveal any authentic dynamics associated with impairing students' health as indicators spread was within 3–5 %. This undoubtedly means that a young body still has high adaptation capabilities and an education process is organized properly. Analysis of fifth-year students was especially indicative in this respect; although moderate risks were higher for them than for students of younger study years, pronounced risks turned out to be practically 2–2.5 times lower. This indicates that both adaptation processes are at work and proper education conditions have been provided for students.

Next, we analyzed a possible relationship between CVDs risks and body mass index. Already 30 % of the respondents (235 students) turned out to have overweight; still, despite overweight being an unfavorable predictive indicator, we did not identify any authentic increase in CVDs risks in students with overweight against their peers with normal body weight (Table 1).

The answers given to the questions related to alcohol consumption clearly indicate that more than a half of the respondents, namely 54 % (420 students), already drank alcohol with various periodicity. We re-

vealed a direct relationship between alcohol consumption and risks of developing CVDs. These risks were absent only for 11 % of the students who consumed alcohol whereas the share was 20 % among those who did not drink alcohol, that is, practically two time higher. A moderate risk of CVDs was 10 % higher among those students who drank alcohol and a pronounced risk turned out to be 2.5 times higher than among their non-

drinking peers. According to some studies, a person starts consuming alcohol at an average age of 15.8 years. Also there are scientific proofs that recently a trend has been noted for growing risks of alcoholism to occur at younger ages [3, 16, 17]. Our research data, similarly to those obtained by other studies, provide clear evidence of an existing relationship between alcohol consumption and elevated CVDs risks (Figure 2).

Table 2

Analysis of CVDs risks as per study years

Study year	Total	CVDs risks, % (number)			
		Absent	Moderate	Pronounced	High
1	358	33 (117)	49 (175)	17 (62)	1 (4)
2	145	28 (41)	53 (77)	16 (23)	3 (4)
3	197	34 (67)	49 (97)	16 (31)	1 (2)
4	44	30 (13)	45 (20)	25 (11)	0 (0)
5	44	25 (11)	63 (28)	9 (4)	2 (1)

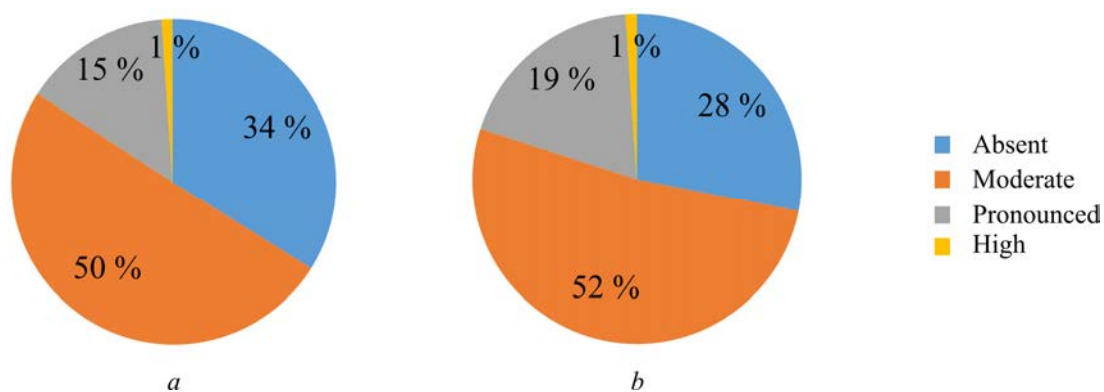


Figure 1. The relationship between CVDs risks and body mass index (Broca index): (a) is normal body weight, (b) is overweight

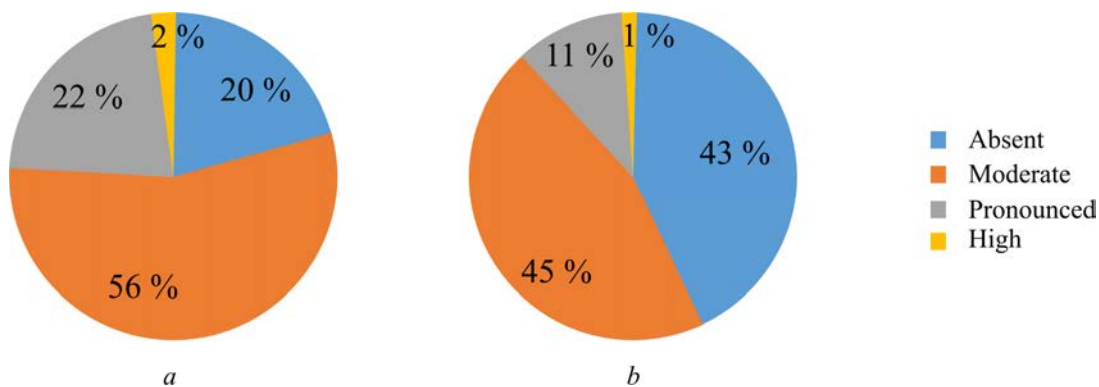


Figure 2. The relationship between CVDs risks and alcohol consumption: (a) students who drink alcohol, (b) students who do not drink alcohol

Signs of stress were identified in 53 % out of all surveyed students (414 people), that is, in more than a half of the respondents. Assessment of CVDs risk established that only 13 % of the respondents did not have any CVDs risks in case signs of stress were identified in them. In case such signs were absent, CVDs risks were absent as well in 53 % of the respondents. This obviously huge difference clearly indicates that stress is a powerful negative factor able to cause CVDs. A moderate CVDs risk was comparable but data on a pronounced CVDs risk turned out to be much more alerting since it was identified for 27 % of the respondents with signs of stress and only for 4 % of those who did not have them. Our data correlate well with those obtained by other studies, which also report a considerable increase in levels of interleukins 1 and 6 in people under stress. The latter are able to damage cardiomyocytes and promote inflammatory changes in the vessel wall [18–22].

Conclusions. Therefore, relying on our study results, we can conclude that cardiovascular pathology is a huge complex issue and the most alerting thing is a rapidly growing tendency for it to occur at younger ages. Risks of developing CVDs occur not only in student years and later; primary

changes in the cardiac muscle and cardiovascular system as a whole can develop already in schoolchildren, which was confirmed by data obtained through our survey of first-year students. It is public knowledge that fighting against bad habits, stress and psychoemotional loads in general still remains a huge relevant challenge. Its relevance is growing menacingly among young people. Overweight resulting from low physical activity and unhealthy ‘fast-food’ diets, an early age of being introduced to alcohol, and a hectic tempo of modern living often resulting in stresses and neurosis are all commonly known harmful factors able to cause not only cardiovascular pathology but also diseases of the nervous, endocrine and other systems of the body. This situation requires additional immediate attention as well as maximum efforts taken by both HEI administrations in order to control these factors and develop personalized prevention and school administrations in order to implement more comprehensive prevention programs for schoolchildren.

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