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Risk factors for the development of hypertension in medical students of the college of vocational studies in Subotica

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blood pressure of the subjects was 118/74 mmHg. In 15% of the subjects, we found elevated systolic blood pressure, and in 18%, elevated diastolic blood pressure. The conducted research revealed the presence of risk factors in daily habits, such as smoking in two thirds of respondents, habits of subsequent salting of food and consumption of sweets, coffee in more than half of respondents. In order to reduce these impacts, it is necessary to carry out health and educational work with the younger population in order to raise awareness about the prevention of hypertension.

Key words: hypertension; students; risk factors; eating habits; lifestyle.

List of abbreviations: CVD – cardiovascular diseases; BP – blood pressure, RND – Registered nutritionist-dietitian, RN – Registered nurse; ESC – European Society of Cardiology; SBP – systolic blood pressure; DBP – diastolic blood pressure; WHO – World Health Organization.

INTRODUCTION

Cardiovascular diseases (CVD) include a group of diseases that affect the heart and blood vessels. They are the leading cause of death and are responsible for half of all deaths in the developed countries of the world, thus posing a significant public health problem [1].

Arterial hypertension belongs to the group of the most common CVDs and represents elevated blood pressure (above 140/90 mm Hg) [2]. According to the results of the 2019 population health survey in Serbia, 30% of the population is diagnosed with hypertension, and 46% of the population has significant hypertension according to the population survey [3]. Although hypertension is typical of older age, it can also occur in

Abstract

Arterial hypertension belongs to the group of the most common cardiovascular diseases and represents elevated blood pressure above 140/90 mmHg. A significant risk factor for the development of hypertension is improper diet, lack of physical activity, excess body weight or consumption of alcohol and cigarettes. The aim of this work was to evaluate the level of blood pressure and the risk factors of hypertension present among student population. The research was conducted in the form of a cross-sectional study among students of the College of Vocational Studies in Subotica, during summer semester 2022. The research instrument was a survey questionnaire designed for the needs of this study, as well as a digital "Microlife" tensiometer. The SPSS 20 program was used for statistical analysis. 33 students participated in the research, mostly women (91%), average age 26 years. The average systolic arterial

younger people, usually accompanied by sparse and nonspecific symptoms, which is why it is usually not recognised [4]. Studying and attending university/high school represent a significant period of lives young people. Human health is intimately linked to the state of the environment, e.g., less physical activity, lower consumption of fruits and vegetables with a concomitant increase in consumption of fast food, caffeinated beverages and alcohol [5], which may have a negative effect on blood pressure (BP). A 2007 study in Spain found that up to 19.5% of university students had hypertension, and the percentage was much higher in young men than in women (19.5% vs. 1.5%) [6]. According to recent results from 2016 and 2018, as many

as 13% [7] and 14.9% of the student population have elevated blood pressure [8].

For more than a decade, hypertension has persisted in young people, creating a good breeding ground for the development of later cardiovascular complications, although the main risk factors could be avoided by an appropriate lifestyle.

The International Hypertension Society and the World Hypertension League have declared May 2022 as May Measurement Month (MMM22). This represents a public call for timely detection and prevention of potential hazards as a result of hypertension. Every May, various programs were organized for preventive blood pressure measurement as one of the leading non-communicable mass diseases [9]. Accordingly, we conducted in May a preventive-analytical survey on the incidence and risk factors of hypertension.

The aim of the work is to evaluate the blood pressure of the student population of the College of Vocational Studies (study program for registered nutritionist-dietitians and registered nurses) in Subotica, as well as to discover possible significant statistical correlations between dietary habits, salt intake and lifestyle habits with the level of blood pressure.

MATERIAL AND METHODS

The research was conducted as a cross-sectional study in May of the summer semester of 2022 on a sample of 33 students of the College of Vocational Studies in Subotica majoring in registered nurse (RN) and registered nutritionists-dietitians (RND).

Participation in the study was voluntary and anonymous, so by completing the questionnaire and consenting to blood pressure measurement, participants agree to participate in the study, which was approved by the College Ethics Committee in May 2022.

The general demographic data of the respondents (sex, age, occupation, tobacco use, physical activity, salt intake, dietary habits that may have an influence on blood pressure) were studied by means of a questionnaire specifically designed for this study. The subjects' blood pressure was measured on the left upper arm using a Microlife digital device (*R&B Medical Company, Serbia*). By default, the device also determines pulse – heartbeats per minute. The measurement was performed according to a standardized protocol.

Arterial blood pressure values are classified as (systolic/diastolic) according to the recommendations of the European Society of Cardiology (ESC) as (systolic blood pressure (SBP)/diastolic blood pressure (DBP)): (1) Optimal: <120/<80 mm Hg, (2) Normal: 120-129/80-84 mm Hg, (3) High-normal/prehypertension: 130-139/85-89 mm Hg, (4) Hypertension I grade: 140-159/90-99 mm Hg, (5) Hypertension II grade: 160-

179/100-109 mm Hg and (6) Hypertension III grade: $\geq 180/\geq 110$ mm Hg [10].

Pulse values per minute are classified as: (1) Slow: ≤ 59 ; (2) Normal: 60 – 80; (3) Moderately rapid: 81 – 99 and (4) Rapid: ≥ 100 per minute [11].

The software package IBM Statistics SPSS 20 was used for statistical analysis of the data. Descriptive statistical analyzes and cross-tabulation analyzes were performed. The nonparametric Pearson's χ^2 test was used to examine the association between two characteristics and to determine the statistical correlation between the two characteristics. Significance values $p \leq 0.05$ were considered statistically significant and $p \leq 0.01$ were considered statistically very significant correlation.

RESULTS

Thirty-three students participated in the study, 13 students (39.4%) from the registered nutritionist-dietitians programme and 20 students (60.6%) from the registered nurses programme. By gender, 30 females (91%) and 3 males (9%) participated. The average age of the respondents is 25.8 ± 1.4 years and ranges from 19 to 48 years. The median age is 22 years, so the basic group was divided into two age categories:

1. younger students (up to 22 years old, $n = 18$)
2. older students (23 years old and older, $n = 15$)

In further analysis, results are presented overall, by field of study, and by age category.

The mean systolic arterial blood pressure of the subjects was 118.5 ± 0.5 (range, 100-160 mm Hg), and the diastolic blood pressure was 74.2 ± 9.8 mm Hg (range, 50-95 mm Hg) (**Chart 1**).

Elevated SBP values were found in 15% of subjects. A higher percentage of normal SBP values was present in those younger than 22 years, and a higher percentage of high-normal BP values was found in subjects ≥ 23 years, which may be explained by the possible influence of age on BP. No significant statistical relationship was found between the level of SBP and gender or field of study.

82% of respondents had normal DBP values, whereas 18% had elevated values. Elevated DBP values were found in 22% of respondents under 22 years of age. No significant statistical relationship was found between the level of DBP and the age groups of the subjects or the field of study (**Table 1**).

The average value of pulse per minute was 77.6 ± 0.8 (in the range of 55-105 beats per minute). 51.5% of the students have a pulse in the desirable range (60-99 beats per minute) (**Table 2**).

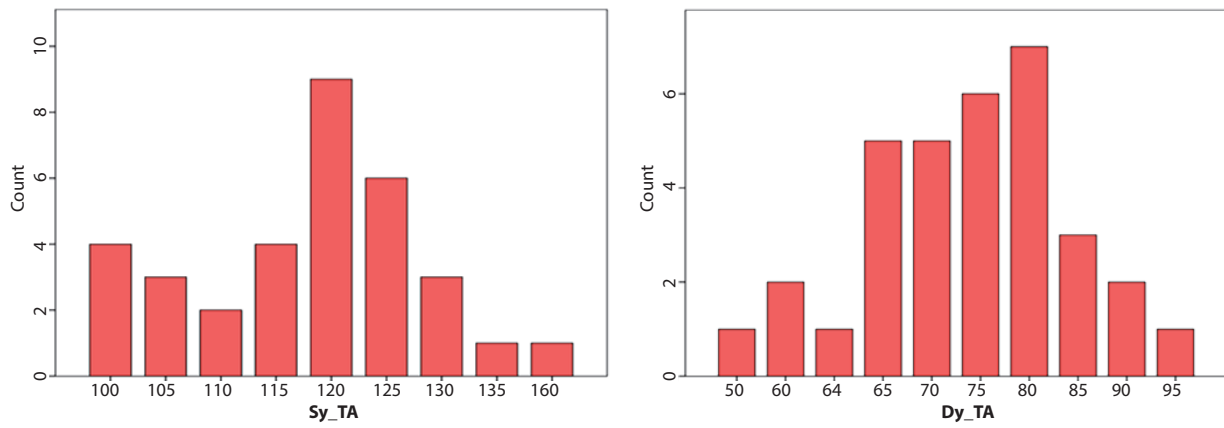


Chart 1. Development of systolic and diastolic blood pressure values in students.

Table 1. Distribution of students according to systolic and diastolic blood pressure categories.

SBP category	Total (n = 33; 100%)	Study program n (% from the total by the study program)		Age n (% of the total by age category)	
		RND	RN	≤ 22 year	≥ 23 year
1. Optimal	13 (39,4%)	4 (30,8%)	9 (45%)	6 (33,3%)	7 (53,8%)
2. Normal	15 (45,5%)	7 (53,8%)	8 (40%)	10 (66,7%)	5 (33,3%)
3. High-to-normal	4 (12,1%)	2 (15,4%)	2 (10%)	1 (5,6%)	3 (20%)
5. Hypertension 2°	1 (3%)	-	1 (5%)	1 / 5,6%)	-
		$\chi^2 = -0,026, p = 0,886$		$\chi^2 = -0,031, p = 0,865$	
DBP category					
1. Optimal	20 (60,6%)	8 (61,5%)	12 (60%)	10 (55,6%)	10 (66,7%)
2. Normal	7 (21,2%)	2 (15,4%)	5 (25%)	4 (22,2%)	3 (20%)
3. High-to-normal	3 (9,1%)	1 (7,7%)	2 (10%)	1 (5,6%)	2 (13,3%)
4. Hypertension 1°	3 (9,1%)	2 (15,4%)	1 (5%)	3 (16,7%)	-
	Total	13 (100%)	20 (100%)	18 (100%)	15 (100%)
		$\chi^2 = -0,085, p = 0,639$		$\chi^2 = -0,120, p = 0,501$	

Table 2. Distribution of respondents according to pulse classification.

Pulse category	Total (n = 20; 61%)	Study program n (% from the total by the study program)		Age n (% of the total by age category)	
		RND	RN	≤ 22 year	≥ 23 year
1. Slow	1 (3%)	1 (11,1%)	-	1 (11,1%)	-
2. Normal	11 (33,3%)	5 (55,6%)	6 (54,5%)	4 (44,4%)	7 (63,6%)
3. Moderately fast	6 (18,2%)	1 (11,1%)	5 (45,5%)	2 (22,2%)	4 (36,4%)
4. Rapid	2 (6,1)	2 (22,2%)	-	2 (22,2%)	-
	Total	13 (100%)	20 (100%)	9 (100%)	11 (100%)
		$\chi^2 = -0,007, p = 0,977$		$\chi^2 = -0,096, p = 0,688$	

According to the average values of the characteristics, among RND direction, the average age of the subjects is 25 years, the average SBP is 118 ± 10.3 mmHg, the average value of DBP is 75 ± 10.6 mmHg, the pulse is $76,5 \pm 16.3$ beats per minute. Towards RN, the average age of the subjects is 26 years, the average SBP is 118.7 ± 13.5 mm Hg, the average DBP is 73.7 ± 9.6 mm Hg, while the average pulse is 78.5 ± 6.4 beats per minute. The results suggest that there is no significant difference in blood pressure between the students of these two courses.

Lifestyle, tobacco use, frequency of physical activity, and daily salt intake may have an influence on the level of blood pressure, so these factors were investigated in this study using a questionnaire (**Table 3**).

Two-thirds of students (61%) exercise daily or four to five times per week, with nearly 80% of respondents exercising vigorously or moderately, consistent with WHO recommendations (at least 150 minutes of physical activity per week). Although one-third of respondents used tobacco, no was found significant effect of tobacco use on BP.

A statistically significant relationship was found between the level of physical activity and the level of DBP, indicating that subjects who exercise intensively have statistically lower DBP (**Chart 2**).

A significant statistical relationship was also found between the level of physical activity and pulse value ($\chi^2 = 0.464$; $p = 0.039^*$); 90% of respondents who engage in intense physical activity have optimal pulse values, while 66% of respondents who engage in moderate physical activity have moderately elevated or increased pulse values.

All respondents believe that increased salt consumption can affect their health. However, two-thirds of respondents do not control their salt consumption in their daily diet. There is a statistically significant relationship between control of salt consumption and age group ($\chi^2 = 0.387$; $p = 0.026^*$). Younger respondents are statistically significantly more likely to control their salt consumption (82%) than older respondents (18%).

Table 3. Lifestyle habits, salt consumption of students and their influence on the values of BP.

Parameter		Total (n = 33, 100%)	Correlation with SBP category	Correlation with DBP category
Level of physical activity	1. Intensive	14 (42,4%)	$\chi^2=0,261$, $p = 0,142$	$\chi^2=0,350$, $p = 0,046^*$
	2. Moderate	13 (39,4%)		
	3. Light	6 (18,2%)		
Frequency of physical activity	1. Every day	7 (21,2%)	$\chi^2=0,078$, $p = 0,667$	$\chi^2=0,153$, $p = 0,396$
	2. 2-3 times a week	7 (21,2%)		
	3. 4-5 times a week	13 (39,4%)		
	4. once a week or less	6 (18,2%)		
Nicotine use	1. Yes	10 (30,3%)	$\chi^2=$ $-0,214$, $p = 0,232$	$\chi^2=0,045$, $p = 0,803$
	2. No	23 (69,7%)		
Daily salt consumption	1. Yes	31 (94%)	$\chi^2=0,199$, $p = 0,266$	$\chi^2=0,087$, $p = 0,631$
	2. No	2 (6%)		
Control of salt intake in the daily diet	1. Yes	11 (33%)	$\chi^2=$ $-0,074$, $p = 0,682$	$\chi^2=$ $-0,242$, $p = 0,175$
	2. No	22 (67%)		
Do you think is sea salt healthier than table salt?	1. Yes	19 (58%)	$\chi^2=0,109$, $p = 0,546$	$\chi^2=0,419$, $p = 0,015^*$
	2. No	14 (42%)		
Subsequent salting of food after preparation	1. Yes	16 (48,5%)	$\chi^2=0,355$, $p = 0,042^*$	$\chi^2=0,104$, $p = 0,566$
	2. No	17 (51,5%)		
Satisfaction with salt intake in the daily diet	1. Yes	23 (69,7%)	$\chi^2=$ $-0,014$, $p = 0,939$	$\chi^2=$ $-0,045$, $p = 0,803$
	2. No	10 (30,3%)		

*Statistical significance at the level $p \leq 0.05$

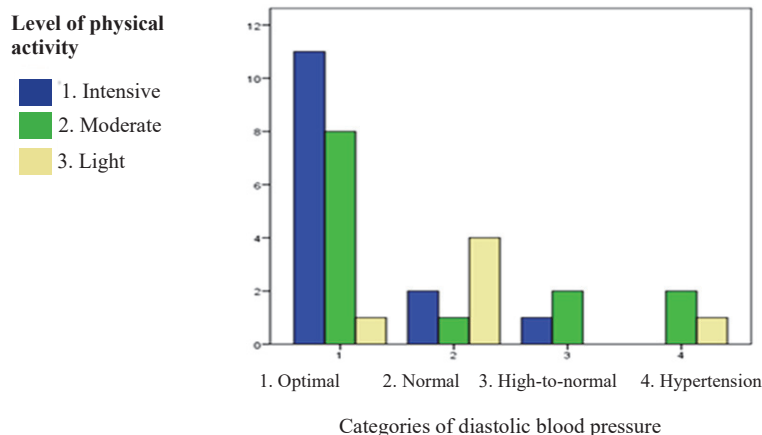


Chart 2. Influence of the level of physical activity on DBP.

This study found that subjects who considered sea salt healthier than regular table salt had significantly lower DBP ($p = 0.015^*$).

A statistically significant correlation was found between the habits of subsequent salting of food and the level of SBP ($p = 0.042^*$). The majority of subjects who subsequently salt their food have optimal SBP (**Chart 3**).

Alternatively used spices instead of table salt among respondents are oregano ($n = 10$), basil ($n = 9$), pepper ($n = 8$), parsley ($n = 5$), dill ($n = 5$), vegeta ($n = 5$), rosemary ($n = 4$), garlic (powder) ($n = 4$), bay leaf ($n = 3$), himalayan salt ($n = 2$), chives ($n = 2$), curry ($n = 2$), turmeric ($n = 2$), chili pepper ($n = 1$), soy sauce ($n = 1$), marjoram ($n = 1$), cumin ($n = 1$), ginger ($n = 1$).

Considering that the majority of respondents use alternative spices in their daily diet, it is evident that they are aware of the importance of reduced or controlled intake of table salt and its possible effects on BP and general health.

There is no statistically significant relationship between the level of BP and the frequency of consumption of dried meat products, fast food, snacks or caffeine (**Table 4**).

However, statistically significant correlations were found between the following characteristics:

1. There is a statistically significant relationship between frequency of consumption of dried meat products and course of study ($\chi^2 = 0.438$; $p = 0.011^*$). Students in the study program RN consume these foods statistically significantly more often (85% of respondents consume dried meat products 3-5 times per week, i.e.75% of respondents consume these foods 6-7 times per week). A relationship was found between the frequency of consumption of coffee and caffeinated beverages and the student's course of study ($\chi^2 = 0.422$; $p = 0.014^*$), i.e., RN students consumed these products significantly more often during the week. Students in the RND program are aware of the importance of consuming these foods less frequently (**Chart 4**).

2. Frequency of consumption of salty cheese correlates with the level of DBP ($p = 0.030^*$). Lower consumption of salty cheese is associated with lower DBP (**Chart 5**).

3. There is a statistically significant relationship between frequency of coffee consumption and age group ($\chi^2 = 0.374$; $p = 0.032^*$). Older than 23 years consumed caffeinated beverages significantly more often, even 6-7 times per week (63%) than younger respondents (**Chart 6**).

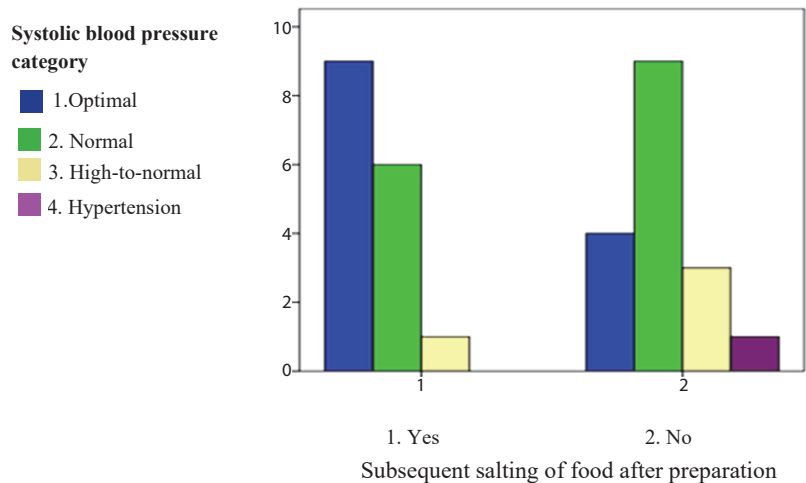


Chart 3. Correlation of subsequent salting of food with the level of systolic blood pressure.

Table 4. Frequency of consumption of potentially hypertensive foods on a weekly basis and their effects on blood pressure.

	Total (n = 33, 100%)	Correlation with SBP category	Correlation with DBP category
Salty cheese			
Never	7 (21,2%)	$\chi^2 = 0,331,$ $p = 0,060$	$\chi^2 = 0,379,$ $p = 0,030^*$
1-2 times	21 (63,6%)		
3-5 times	3 (9,1 %)		
6-7 times	2 (6,1%)		
Cured and smoked meat products			
Never	5 (15,2 %)	$\chi^2 = 0,153,$ $p = 0,396$	$\chi^2 = -0,058,$ $p = 0,748$
1-2 times	11 (33,3%)		
3-5 times	13 (39,4%)		
6-7 times	4 (12,1%)		
Ready-to (instant) food (including soups, preserves, pates)			
Never	11 (33,3%)	$\chi^2 = 0,004,$ $p = 0,981$	$\chi^2 = 0,014,$ $p = 0,939$
1-2 times	17 (51,5%)		
3-5 times	4 (12,1%)		
6-7 times	1 (3,0%)		
Snacks (chips, tortillas, sticks...)			
Never	10 (30,3%)	$\chi^2 = -0,065,$ $p = 0,720$	$\chi^2 = 0,037,$ $p = 0,836$
1-2 times	19 (57,6%)		
3-5 times	1 (3 %)		
6-7 times	3 (9,1%)		
Coffee (including caffeinated drinks – Coca-Cola, other energy drinks...)			
Never	2 (6,1%)	$\chi^2 = 0,132,$ $p = 0,465$	$\chi^2 = -0,129,$ $p = 0,473$
1-2 times	6 (18,2%)		
3-5 times	6 (18,2%)		
6-7 times	19 (57,6%)		

*Statistical significance at the level $p \leq 0.05$

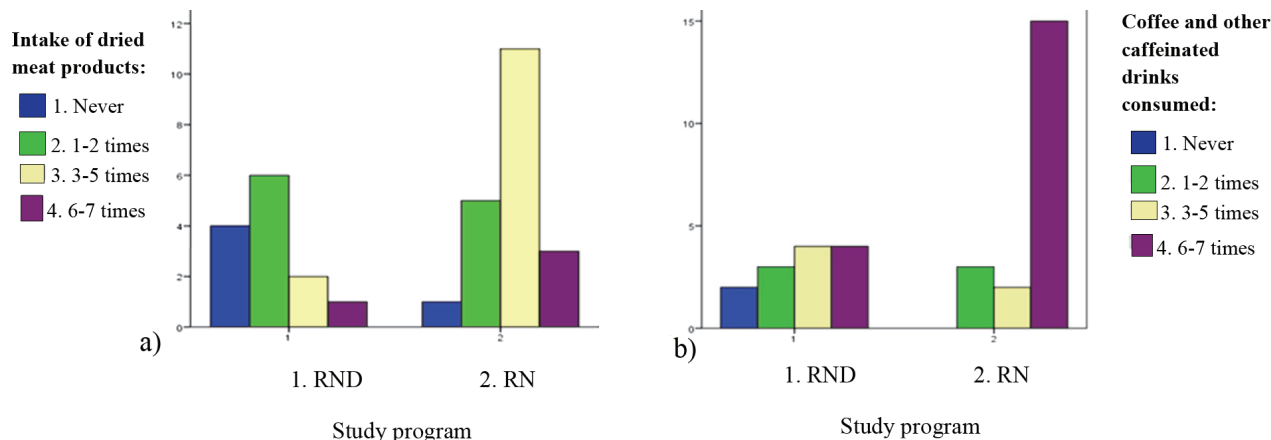


Chart 4. Consumption of dried meat products (a), coffee and caffeinated beverages (b) by study program.

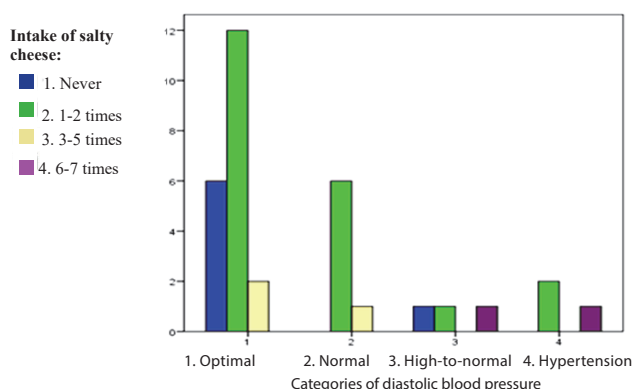


Chart 5. Influence of the consumption of salty cheese on the diastolic blood pressure.

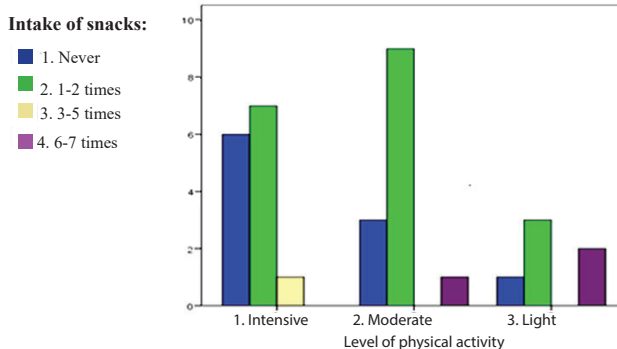


Chart 7. Frequency of snack consumption depending on respondents' level of physical activity.

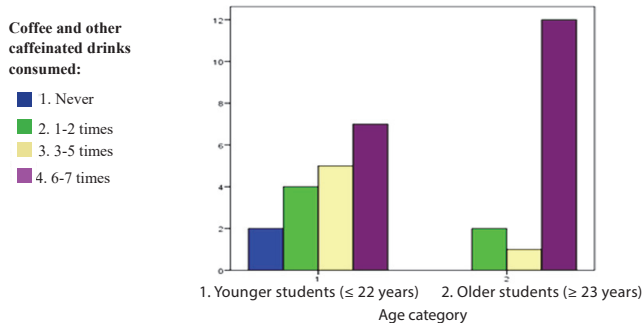


Chart 6. Frequency of consumption of coffee and caffeinated beverages by student age category.

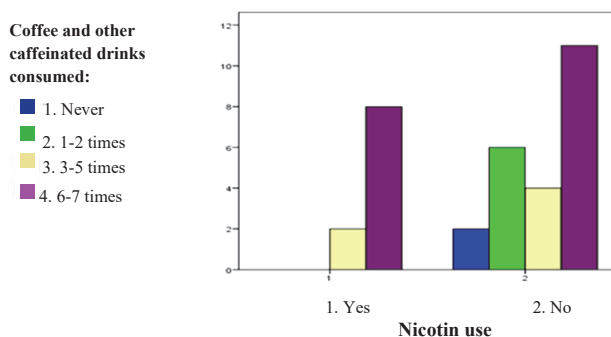


Chart 8. Frequency of coffee consumption according to nicotine use.

these foods frequently, the proportion of nonsmokers who consumed them daily was significantly higher (Chart 8).

DISCUSSION

In this study, 15% of the students were found to have elevated SBP and 18% were found to have elevated DBP, including high-normal (prehypertensive) values, which are of concern at this age because they may develop into hypertension later in life if preventive corrective measures are not taken in time.

4. There is a significant relationship between frequency of snack consumption and level of physical activity ($\chi^2 = 0.359$; $p = 0.040^*$), i.e., 67% of respondents who consume snacks daily have low levels of physical activity (Chart 7).

5. A negative statistical association was found between the frequency of consumption of coffee and caffeinated beverages and tobacco use ($\chi^2 = -0.361$; $p = 0.039^*$). Although all smokers surveyed consumed

The results of this study are consistent with the study conducted in 2016 in Kragujevac (where 13% of subjects had elevated SBP) [7] and in 2018 in Belgrade where 14.9% of subjects had elevated SBP, i.e. elevated DBP values in 7.4% of subjects. In this study, elevated blood glucose levels (above 7 mmol/L) were also found in 17% of the students, which is also a significant risk factor for the development of CVD [8].

The influence of age on the level of blood pressure:

In this study, no statistically significant relationship was found between BP and the age of the subjects, but a relationship was found between the frequency of consumption of coffee and caffeinated beverages in older subjects, who consumed these beverages significantly more often, which may be a risk factor for the development of hypertension and CVD.

Research conducted in Niš in 2008 indicates a positive correlation between the age of students and SBP, while DBP is positively correlated with body weight index and waist circumference, i.e. diet and smoking, and negatively correlated with physical inactivity. Thus, the presence of risk factors increases with age, taking into account biological load, frequency of smoking, but also alcohol consumption, which has been shown to correlate with the subject's age and increase the likelihood of developing CVD [4].

Physical activity of students:

Numerous studies indicate the importance of moderate physical activity in maintaining and improving health, as well as in preventing many diseases of modern times, so it is expected that students of health subjects spend more time in sports or moderate physical activity [4]. This assumption was confirmed in this study, as two-thirds of health students engage in moderate-intensity or vigorous-intensity physical activity at least 4-5 times per week. However, a 2011 study conducted in Kosovska Mitrovica found that only 35% of students engaged in physical activity for more than 30 minutes, while 49% of students spent more than 5 hours per day sitting [12]. The results of a survey conducted in Beočin in 2008 showed that as many as 70% of healthcare workers were physically inactive. Although they have sufficient knowledge about the benefits of regular exercise, they do not apply it in their everyday life [13].

Physical activity is an important ally in the fight against hypertension, because a daily intense exercise of 60 minutes can reduce systolic blood pressure by about 5-10 mm Hg [14,15]. In this study, we found that subjects who exercise intensively have lower mean diastolic blood pressure values, which is important information for potential prevention work. Physical activity statistically significantly lowers the level of systolic and diastolic blood pressure, as well as pulse rate. A study conducted in Niška Banja showed

that a six-week exercise program resulted in a reduction of systolic blood pressure by 9 mm Hg, diastolic blood pressure by 8 mm Hg, and heart rate by 5.3 beats per minute. In addition, the exercise program significantly reduced blood triglyceride levels, which is also an important step in the prevention of cardiovascular complications [16]. In our study, we confirmed that subjects who exercise more intensively have lower, i.e. optimal, pulse values.

Consumption of snacks, convenience foods, and ready-to-eat meals:

Students are more inclined to eat foods that are high in energy value but low in nutrients, i.e., eating fast food and meals outside the home and skipping meals. It is estimated that only half of the students eat breakfast regularly [5,12,17]. Low consumption of fruits, vegetables, and milk is also characteristic (only a quarter of students consume fruits daily and only 10% of students consume dairy products daily), but high consumption of carbonated drinks, snacks, and sweets [5,12]. In this study, it was found that 58% of students consume snacks 1-2 times per week, while 12% of students consume them daily.

A study from Bosnia and Herzegovina states that 64% of female students and 58% of male students consume snacks daily. According to the results, one third of students do not consume salty snacks at all, which is in line with the results of the present study [5]. According to the results of a study conducted in Belgrade in 2015, 76-86% of students regularly consume salty snacks (of which 59% consume them more frequently than three times a week) [18,19].

A more recent study from Belgrade in 2016 shows that 59% of students consume salty snacks and 70% regularly consume sweets (20% of which are consumed daily), especially during the exam period. In this way, additional amounts of unnecessary salts are added [20].

In this study, it was found that 15% of students consume convenience foods daily. On the other hand, a study among Belgrade medical students found that on average 64% of students consume ready meals and fast food [19].

Consumption of salt, salty cheese and cured meat products:

Excessive intake of table salt, i.e. sodium, is one of the risk factors for hypertension and cardiovascular disease. The WHO has recommended that salt intake be reduced by 30% worldwide by 2025. It is estimated that hypertension would probably not occur at all in the population if salt intake were less than 3 g per day [21]. A study conducted in 2016 in Kragujevac found that 81% of students have the habit of adding salt to their food [7]. Since in our study it was found that half of the respondents added salt to their food, it could be

assumed that healthcare students study subjects related to nutrition and dietetics during their studies and that the knowledge acquired in these subjects about proper nutrition has a positive effect on the lower presence of these habits.

It was found that students who subsequently salted their food had more optimal BP values than those who did not. One possible explanation for this is that students with optimal BP most likely use less salt during meal preparation and add it only at the end, therefore their total daily salt intake is lower. Meal time is also cited as a recommendation for practical reduction of salt intake in hypertension [22].

In this study, consumption of salty cheese and cured meat products were investigated as the most common types of hidden salt intake. It was found that 15% of the respondents regularly consumed salty mature raw meat products, while almost 52% of the respondents consumed dried meat products. The salt content in mature cheese is an important component, so 100 g of such a product exceeds the recommended daily intake of sodium (up to 2300 mg) [14,23]. For example, parmesan cheese contains 1.7 - 1.8 g of salt in 100 g, 60 g of feta cheese contains 2.3 g of salt and mozzarella cheese contains 0.7 g of salt in 60 g of the product [24].

The RN students used these foods significantly more often than the RND students, and it is possible that knowledge of the properties of these products by nutritionists and dietitians contributes to lower frequency of consumption. In this study, a correlation was found between more frequent consumption of salty cheese and elevated DBP and the potential negative effects of these foods on hypertension control should be emphasized in health and educational counseling.

Consumption of coffee, caffeinated beverages, and energy drinks:

76% of university students consume coffee and caffeinated energy drinks daily or up to five times per week, and significantly more often than students majoring in text messaging, which can be explained by the fact that a large proportion of students work shifts and are more likely to reach for these beverages during and after work.

In comparison with other research, a study conducted in Belgrade (2016) indicates that energy drinks are consumed by about 22.5% of students [19], while a 2020 study concludes that 72% of students consume energy drinks. The most common negative effects of energy drink consumption are weight gain (in 24% of cases), increased thirst and hunger (in 15% of cases), headaches (in 3% of cases) and heart palpitations. Two-thirds of university students consume energy drinks during exam time because of their effect on mental concentration and alertness [25].

Nicotine use:

Smoking is a significant risk factor for the development of cardiovascular disease, including hypertension. In this study, one-third of university students were found to use tobacco, although no significant association was found between blood pressure and tobacco use. On the other hand, a study that examined the habits of healthcare workers concluded that more than half of healthcare workers use tobacco regularly [13].

A study conducted in Belgrade (2013) stated that the prevalence of smoking among students is about 33% [18], while a study conducted in Kragujevac (2016) found that smoking as a risk factor for cardiovascular disease occurs in 46% of students, with a higher percentage in women [7]. A study from Niš (2008) states that one in four students smokes and it is noted that this habit is influenced by numerous life conditions that do not necessarily correlate with health habits [4].

Practical implications and opportunities for prevention programs:

Low physical activity and inappropriate dietary habits are the most important risk factors for the development of CVD that can be influenced and should be targeted by preventive measures [26]. Preventing the establishment of negative behaviors at a younger age is considered a much simpler and more effective method of reducing cardiovascular risk than changing already established, formed habits among adult population. The WHO points out that isolated programs aimed solely at controlling hypertension are not as economically viable or sustainable as integrated, comprehensive programs aimed at controlling multiple risk factors for noncommunicable diseases [27].

The data obtained from this study will allow timely and appropriate planning of preventive education on proper diet and food consumption among student population with the goal of early prevention of CVD.

Research limitation:

The results of this study cannot be representative of the entire student population in Subotica given the small number of respondents, but they can be used to identify the most common risk factors and make recommendations for further research.

Due to the disproportionate number of male and female respondents in this study, it was not possible to conduct an analysis by gender.

A major limitation of this study is that no data on body weight and height, i.e., no data on body mass index and waist circumference, were collected from the subjects to determine the possible effects of nutritional status on BP levels.

CONCLUSION

Cardiovascular diseases are one of the leading causes of death in the world, so it is necessary to make the younger population aware of the dangers that can result from these diseases.

In this study, elevated systolic blood pressure was found in 15% of the students surveyed and elevated diastolic blood pressure in 18%, while the mean blood pressure was 118.5/74.2 mm Hg. Risk factors among the student population were identified, as well as preventive factors that can be associated with adequate education of medical students about nutrition and the importance of physical activity. With appropriate preventive measures, it is possible to make lifestyle changes to prevent and/or treat cardiovascular diseases.

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CONTRIBUTION

The survey questionnaire used in the research:

1. Gender: Female Male
2. Age: yrs.
3. Value of blood pressure: mm Hg
4. Degree of physical activity: Intensive Moderate Light
5. Frequency of physical activity: Daily
 4-5 times per week
 2-3 times per week
 Once per week or less frequently
6. Have you used tobacco? Yes No
7. Do you use salt in your daily diet? Yes No
8. Do you control the daily intake of salt in your diet? Yes No
9. Do you think sea salt is healthier than the "regular" salt used in everyday life?
 Yes No
10. Do you add salt to meals after preparation? Yes No
11. Do you think that excessive salt consumption can affect your health?
 Yes No
12. Indicate which alternative spices you use most often in place of table salt?

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13. Are you satisfied with the amount of salt you consume daily? Yes No

14. During the week, how often do you consume salt in your diet (check the appropriate statement):

	Never	1-2 times	3-5 times	6-7 times
Salty cheese				
Cured and smoked meat products				
Prepared foods (Ready-to food, including soups, preserves, pates)				
Snacks (chips, tortillas, sticks...)				
Coffee (including caffeinated drinks – Coca-Cola, other energy drinks...)				

Faktori rizika za razvoj hipertenzije kod studenata medicinskih smerova visoke škole strukovnih studija u Subotici

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Kratak sadržaj

Arterijska hipertenzija spada u grupu najčešćih kardiovaskularnih oboljenja i predstavlja povišen krvni pritisak (iznad 140/90 mmHg). Značajne faktore rizika za razvoj hipertenzije predstavljaju nepravilna ishrana, nedostatak fizičke aktivnosti, prekomerna telesna masa ili konzumacija alkohola i cigareta. Cilj ovog rada je da proceni nivo krvnog

pritiska i prisutnih faktora rizika hipertenzije u studentskoj populaciji. Istraživanje je sprovedeno u vidu studije preseka među studentima Visoke škole strukovnih studija u Subotici, tokom letnjeg semestra 2022. godine. Instrument istraživanja bio je anketni upitnik koji je osmišljen za potrebe ove studije, kao i digitalni „Microlife“ tenziometar. Za statističku analizu korišćen je SPSS 20. program. U istraživanju je učestvovalo 33 studenata, pretežno žena (91%), prosečne starosti 26 godina. Prosečan sistolni arterijski krvni pritisak ispitanika iznosio je 118/74 mmHg. Kod 15% ispitanika utvrđene su povišene vrednosti sistolnog, a kod 18% povišene vrednosti dijastolnog krvnog pritiska. Sprovedenim istraživanjem uočeno je prisustvo faktora rizika u svakodnevnom navikama, poput pušenja kod dve trećine ispitanika, naknadno dosoljavanje hrane i konzumacija slatkiša, kafe kod više od polovine ispitanika. Kako bi se redukovali ovi uticaji, neophodno je sprovesti zdravstveno-vaspitni rad sa mlađom populacijom u cilju podizanja svesti o prevenciji hipertenzije.

Ključne reči: hipertenzija; studenti; faktori rizika; navike u ishrani; stil života.