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Health Behaviour of Police Officers in Relation to Hypertension. Observations from a Hungarian County

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ABSTRACT. *Purpose*: The aim of this study is to assess the health behavior of those who are treated for high blood pressure among law enforcement officers, compared to those who are not under treatment for high blood pressure. ***Methodology:*** In Hungary, a cross-sectional survey was carried out among those serving in the County of Szabolcs-Szatmár-Bereg. This is the publication of partial results of a study carried out in the framework of a comprehensive health behavior survey. ***Findings:*** The number of items in the sample is 1,719. 11.40% were treated for hypertension. There is a significant difference in gender ($\chi2$= 3.979; p=0.047). The highest proportion of people with hypertension is among those with a secondary school leaving certificate (18.8%). The lowest prevalence is among university graduates (9.1%). Education level is significantly associated with hypertension ($\chi2$=17.013; p=0.004). There is a very strong significant association between length of time in service and hypertension ($\chi2$=83.204; p= 0.000). The proportion of people with hypertension increases steadily with the length of service. No significant differences were found for work schedule, smoking, alcohol consumption or physical activity. When examining the relationship between social support and hypertension, there is a significant difference between grandparent support and parent support (p=0.002; p=0.012). Those treated for hypertension can count on less parental or grandparental support. Non-hypertensives have higher personal health awareness (p=0001), as well as higher self-assessment of health (p=0.000). They are more motivated to avoid unhealthiness (p=0.002) and to maintain

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their health (p=0.009). They feel in better health (p=0.000) and are confident that this will be maintained in the future (p=0.000). Health concern is higher among hypertension patients (p=0.045). Both internal and external health control scores are higher (p=0.000; P=0.001) as is health anxiety (p=0.000). ***Value:*** The prevalence of hypertension increases with age, so it is of paramount importance that appropriate health promotion programmes help law-enforcement workers to maintain their health.

Keyword: high blood pressure, law enforcement, health behavior, health promotion

INTRODUCTION

The present study was designed to explore the prevalence of hypertension among law enforcement workers. We compare the health behaviours of untreated and treated hypertensives, highlighting the health behaviours of police officers treated for hypertension. In our study, we do not discuss the different forms of medical treatment, we only examine the lifestyle-related factors.

In Europe, cardiovascular disease accounts for 48% of all deaths (Allender S, 2008). Hypertensive heart disease is responsible for about a quarter of the causes of heart failure. Appropriate management of hypertension reduces the risk of cardiovascular disease outcomes, including stroke, heart attack, and heart failure (SPRINT, 2017, Towsend, 2016)

IN THE FIELD OF LAW ENFORCEMENT

Hypertension among police officers is high according to a review of various studies. Different countries have studied the prevalence of hypertension and the health factors that prevent it in different ways.

In a study in India, 67.90% of police officers working in a district were found to have hypertension, of whom 75.8% were diagnosed. Length of service, higher position, and inadequate diet show a higher association with hypertension. It was found that an increase in BMI and waist circumference also increases the prevalence of high blood pressure. (Chauhan, 2022) Results from the West Bengal region also show that police officers have more cardiovascular risk factors than the general population in that region. BMI index, hypertension, cholesterol, triglyceride, and lipoprotein levels were also higher among police officers (Saha, 2010)

Zimmerman (2012) examined cardiovascular diseases and the prevalence of their risk factors in his meta-analysis of law enforcement studies. Although there are conflicting studies, the majority of research suggests that the risk of cardiovascular disease and mortality among police officers is high among active (15.3-38.5%) and retired police officers. High blood pressure, dyslipidemia, obesity, diabetes, smoking, and a sedentary lifestyle are all factors that contribute to the development of these diseases. Zimmerman highlights profession-specific risk factors, such as sudden physical stress (a mostly sedentary activity is suddenly interrupted by extreme physical exertion), events experienced in connection with the performance of work tasks, and stress from the organizational system. Shift work also affects health by changing sleep and eating habits.

In a meta-analysis, Magnavita (2018) investigated the association between police stress and cardiovascular disease. Most of the studies concluded that high levels of stress increase cardiovascular morbidity and its risk factors. The risk factors include weight gain, hypertension, dyslipidemia, and diabetes. These associations have better been supported by longitudinal studies.

HEALTH BEHAVIOR OF HYPERTENSIVE PATIENTS

Several studies have been conducted to investigate the main health behaviors of people with hypertension. There were studies where it was found that those treated for hypertension improved their lifestyle to maintain their health, but there are also several studies where this lifestyle change was not observed. Most countries monitor the health behavior of their population to help improve a better quality of life by making changes.

A Dutch sample found that subjects who are generally aware of their high blood pressure lead a healthier lifestyle than those who are unaware of it. They are characterized by dietary changes, lower BMI, and lower alcohol consumption. (Scheltens, 2010)

A Canadian survey published in 2008 found that the main lifestyle modification for newly diagnosed hypertensive patients was smoking cessation. Almost one in five smokers quit after being informed that they had high blood pressure. A smaller change was observed in the reduction of physical inactivity. People who did not take antihypertensive medication were not more likely to make lifestyle changes. People who took antihypertensive medication were more likely to quit smoking and more likely to increase their physical activity. The proportion of obese people (BMI higher than 30 $^{kg}/_{m2}$) increased rather than decreased after the diagnosis of hypertension. Weight gain was particularly significant among those using antihypertensive medication and was greatest among women using beta-blockers, raising the possibility of a drug effect. (Neutel, 2008)

However, according to data published in 2012, most Canadians changed their lifestyle after a blood pressure diagnosis. Those who reported less physical activity mostly indicated a chronic illness as the cause. Lack of motivation was found to be behind the change in eating habits. Low desire, interest, or awareness is often a barrier to limiting salt intake, changing diet, losing weight, stopping smoking, and reducing alcohol consumption. (Gee, 2012)

According to the results of a study conducted among people over 50 years of age in England, the prevalence of smoking is lower in the case of hypertensives, which is due to the increased frequency of quitting. They are characterized by a sedentary, inactive lifestyle, but this is more due to associated diseases and movement problems rather than the belief that taking medication can compensate for the health condition, and thus lifestyle changes are not necessary. High alcohol consumption and a sedentary lifestyle probably contributed to the development of high blood pressure in the first place. (Steptoe, 2009)

In a Korean longitudinal study, it was found that among hypertensive subjects compared to healthy subjects, the group diagnosed with hypertension was more obese than those without hypertension. However, smoking and alcohol consumption decreased over time with all participants, and physical activity increased. A group-by-group interaction was observed for smoking: smoking decreased to a greater extent in the group diagnosed with high blood pressure. No significant interactions were found for other behaviors. (Ahn, 2023)

In a survey conducted among hypertensives in Indonesia, a positive correlation was found between the responsibility of those with high blood pressure and nutrition as a health-protective behavior. However, due to the lack of motivation and planning, exercise was not typical. (Wicaksana, 2022)

During a Brazilian survey, the reports showed that dietary recommendations were followed, but this was not reflected in the anthropometric indicators. The importance of family support was significant, for example, in changing meals, but rather as a hindering factor. Regular exercise was not typical. (Barros, 2014) Another study in Brazil found that 63.8% of hypertensives did not exhibit appropriate health behaviors. The tendency was that they did not give up health-damaging behaviors (smoking, alcohol consumption). The least reported was the consumption of fruit and vegetables. The most important factors influencing inappropriate behavior change are the short time since diagnosis, not taking medication, not visiting a doctor, and subjectively perceived good health (V.Dionato, 2021)

According to a Greek study, a change in the diet of hypertensive patients was detectable, which meant healthier diets. (Pitsavos, 2006)

Research on a sample from Iran showed that knowledge of the disease did not significantly change behavior. Two groups were compared. One group knew about their hypertension, the other group did not know about it, but the tests showed hypertension. There were differences in salt and alcohol consumption and smoking between those who knew about their disease and those who did not. Those who were aware of their disease and did not take medication led a better lifestyle than those who had hypertension and took antihypertensive medication. Those who were unaware of their condition had higher levels of physical activity than those who were aware of their condition. The reason for this may be related to age. Those who were unaware of their disease were younger and more likely to be more physically active than older people with hypertension (Akbarpour, 2018).

In their meta-analysis, Elnaem (2022) found that factors such as sociodemographic factors and comorbidity were the most common obstacles to controlling high blood pressure. This was followed by barriers to medication adherence, followed by lifestyle barriers (dietary habits, physical inactivity), and barriers related to affordability and accessibility. Obstacles related to care and awareness (knowledge, health literacy) were among the last of the aggravating factors, together with obstacles related to prescribed antihipertension medication.

FACTORS UNDERLYING HEALTH BEHAVIOR IN HYPERTENSIVE PATIENTS

Factors underlying health behavior of hypertensive patients have been found in several studies. Health behavior was significantly associated with income, social support, knowledge about hypertension, and perceived barriers. These findings suggest that health behavior of people with hypertension can be improved by increasing knowledge about hypertension, increasing social support, and decreasing perceived barriers. (Oo, 2018)

A cross-country study on medication adherence found that low age, low self-efficacy, and perceived barriers (costs) were factors behind not taking medication. In Hungary, social support is also found to be an influencing factor: those with lower levels of social support comprise a higher proportion of those who do not take medication. (Morrison, 2015) Building a relationship with patients and providing personalized counseling improves self-efficacy and social support, thereby promoting appropriate medication taking. (Criswell, 2010)

Eshah (2021) found that behavior change was not influenced by sociodemographic factors or clinical history. Concerning smoking, there was an inverse proportionality - if physical activity and weight control were higher, there was less tendency to reduce smoking, which may be due to the higher proportion of non-smokers (Eshah, 2021).

Adults with high self-efficacy are more likely to adhere to self-care in the management of hypertension, so it is advisable to design interventions that improve self-care through self-efficacy (Tan, 2021).

According to Wiener's research (2017), people with hypertension report significantly higher vulnerability and lower self-efficacy than those without hypertension), which may promote the pursuit of an active lifestyle. Those who (no longer) have high blood pressure as a result of medical treatment and lifestyle changes (regular physical activity) do not have increased vulnerability. Those with current high blood pressure had lower action planning and self-efficacy level, which makes it difficult to develop appropriate health behaviors (Wienert, 2017).

HEALTH PROMOTION PROGRAMS

According to the main recommendations, lifestyle changes for the treatment of high blood pressure are mainly the cessation of harmful addictions (smoking, alcohol consumption), developing an appropriate diet, and reducing sodium, increasing physical activity, and reducing obesity (Guy De Backer, 2003; Maraj, 2013).

Given the tendency for cardiovascular disease risk factors to accumulate, BMI assessment and blood pressure measurement are excellent non-invasive screening tools for core wellness programs. Second, individuals at higher risk of cardiovascular disease (those in the prehypertension and hypertension categories) should receive individualized counseling for non-pharmacological management of blood pressure, including diet, sodium restriction, physical activity, moderate alcohol consumption, and maintaining a healthy weight, weight loss for those with BMI in the overweight/obese category (Kales, 2009).

Motivational interviewing can effectively improve blood pressure control in patients with hypertension (Huang, 2023). Physical activity support programs and wellness programs contribute to reducing work-related stress and increasing individual well-being, reducing the development of chronic diseases (Acquadro Maran, 2018).

Health behaviors are also supported by complementary interventions with a positive psychology approach, targeting the emotional correlates of behavior that facilitate successful behavior change. However, research is still needed to uncover the exact mechanisms. (Feig, 2022) In law enforcement, intervention approaches based on positive psychology are effective in reducing depression, anxiety, and negative effects in particular. However, the effect was limited in terms of other health behaviors. (Kukucska D, 2023).

METHOD

Sample

The research was conducted in 2020, 2021 and 2022. The target population of the research was the professional staff of the Szabolcs-Szatmár-Bereg County Police Headquarters. The questions on hypertension were also part of a complex survey package on health awareness and health behaviour. The research was approved by the United Psychological Research Ethics Committee (EPKEB) (2021-70 (amendment 2020-24).

The questionnaire was filled in as part of the compulsory periodic psychological aptitude test for police officers. Before starting to fill out, those intending to participate in the research received written and verbal information about the questionnaire and its voluntariness. The participants could start participating after giving their written consent. The number of professional police officers in Szabolcs-Szatmár-Bereg County is approximately 2,200. The approximate percentage of respondents was 78%. The number of responses providing data relevant to hypertension was 1,719. 87.9% (n= 1467) of the respondents were male, 13.8% were female (n=235). The mean age of the sample is 39.19 years (SD=8.13), the youngest respondent was 21 years old and the oldest was 62 years old.

Measuring tools

In addition to the traditional socioeconomic characteristics (gender, age group, educational level), the questionnaire also includes the length of time spent in the workforce.

The work schedule is among the factors we examined. In law enforcement, police officers have a variety of working hours, so the questionnaire includes the following most common work schedule:

- Office: from Monday to Friday between 8 a.m. and 4 p.m
- Commanding: in practice, it usually corresponds to the office work schedule but the schedule can be changed at any time, depending on the given command
- Shift 1.: 12/24-hour service
- Shift 2.: 24/48-hour service

The 19-item disease list used in the Hungarostudy 2013 survey was also included in the questionnaire. Respondents were asked to indicate whether they had been treated as an outpatient or had received inpatient care for diseases such as diabetes, gastric ulcer, hypertension, cancer in the past year or during their lifetime (Susánszky É., 2013). Among those who gave responses, we singled out those suffering from high blood pressure.

The frequency of alcohol consumption was measured with the following question:

How often do you drink alcoholic beverages:

1. never
2. monthly or less often
3. twice or four times per month
4. two to three times per week
5. at least four times per week

The following questions were asked in relation to smoking:

- Which statement is true for you? 1. have never smoked, 2. have quit, 3. still smoke.
- How long have you been smoking?.....years
- If you smoke, usually how many cigarettes do you smoke per day? .....db

How often do you do sports such as swimming, running, cycling, football, aerobics or other physical activity? 1. never; 2. less than once per week; 3. once per week; 4. several times per week

Apart from playing sports, how often do you do physical activity, such as gardening or construction, where your heart beats faster for at least 10 minutes, you get overheated, or you sweat: 1. never; 2. once a week; 3. several times per week

Do you pay attention to what and how much you eat? 1.always; 2. most of the time; 3. sometimes; 4. never

Are you on a special diet? 1. yes; 2. no

Do you take nutritional supplements? 1. yes; 2. no

To assess social support, we used the Caldwell Social Support Questionnaire, which is used to assess the various sources and extent/measures of social support. It was translated into Hungarian by Kopp (1992). The following are possible sources of social support: parent, spouse, partner, grandparent, schoolmate, neighbor, colleague, friend, child, relative, helper, church group, association-civic group. The strength of the support was described on a four-point scale: 0 = never; 3 = often or always.

The questionnaire developed by Snell (1991) focuses on the measurement of personality variables related to physical health. The Health Orientation Scale consists of 50 items related to health status.

Respondents were asked to indicate the extent to which they identify with each statement on a 5-point likert scale (1 = not at all characteristic of me, 2 = slightly characteristic of me, 3 = somewhat characteristic of me, 4 = moderately characteristic of me, and 5 = very characteristic of me). The 50 items are divided into 10 subscales, each containing 5 items. Total scoring for each subscale was 0–20. The subscales measure the following personality variables:

1. Personal Health Consiousness, PHC
2. Health Image Concern, HIC
3. Healt Anxiety, HA
4. Health-esteem and Confidence, HEC
5. Motivation to Avoid Unhealthiness, MAU
6. Motivation for Healthiness, MFH
7. Internal Health Controll, IHC
8. Externall health Control, EHC
9. Health Expectations, HE
10. Health Status, HS

Statistical analysis

The data were analyzed using the IBM SPSS Statistics for Windows v26.0 program package. After calculating the basic statistics, we checked the normality of the data using the Shapiro-Wilk test, and further analyses were designed accordingly. Since the data typically showed a non-normal distribution, we chose non-parametric tests in the analyses: we performed a Chi-square test for gender differences, educational attainment, work schedule, length of service and some health behavior indicators. Mann-Whitney U test was used for possible sources of social support regarding and the scales of the HOS questionnaire. The reliability indicators of the HOS questionnaire, the Cronbach-α values were between 0.582 and 0.818 so the questionnaire is considered reliable.

RESULTS

Of the 1719 respondents, 87.9% were male and 13.8% were female (Figure 1).

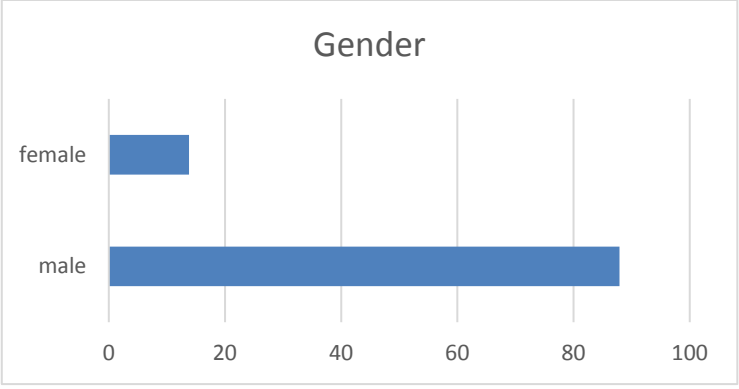

Figure 1. Gender frequency (edited by the authors)

The minimum educational requirement for police officers is a secondary school leaving certificate. The most common is specialized post-secondary education for law enforcement personnel (45.08%) (Figure 2). This training provides a professional police qualification to graduates. So the majority of the sample have done secondary school level education (secondary school certificate or police professional qualification) (59.62%). One-third of the respondents have done higher education (34.09%).

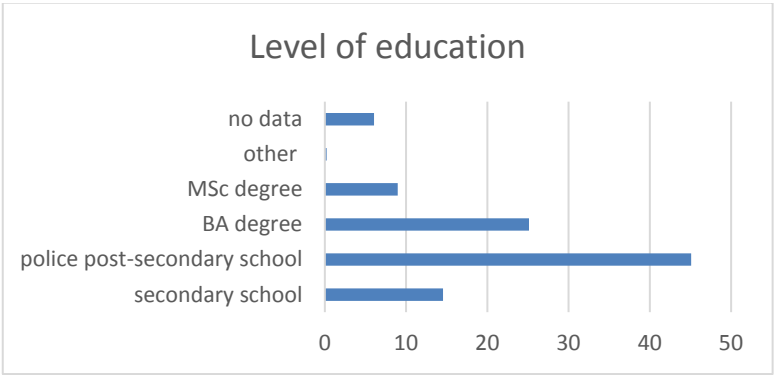

Figure 2. Level of education (edited by the authors)

In terms of length of service, those who have served for 15 to 20 and 20 to 25 years accounted for more than 40% of the sample (41.88%), they are the most prominent group in the sample. Those with more than 30 years of service are the least frequent (4.07%) (Figure 3). Basically, due to the previous retirement legislation and the then existing career model, there are currently few members with more than 31 years of service.

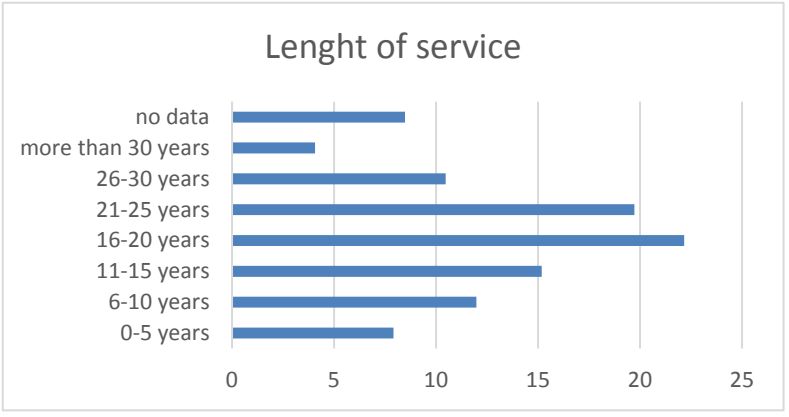

Figure 3. Lenghth of service (edited by the authors)

Law enforcement personnel can work in various work schedules (Figure 4). The official working schedule includes the period between 8 am and 4 pm, with 10.4% of the staff work in such schedule. The command work schedule can vary depending on service needs, usually the aim is to work according to the office schedule. More than half of the staff, 53.0%, work under command schedule. Shift 1, which means the work schedule in the 12/24 cycle working pattern, affects 19.9% of the staff. The lowest proportion, with 1.2%, in the sample, is Shift 2 which is a 24/48 hour working pattern.

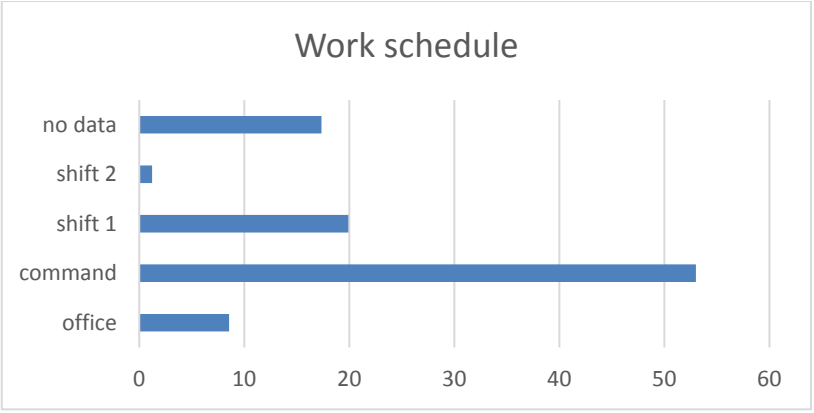

Figure 4. Work schedules (edited by the authors)

32.3% of respondents smoke (Figure 5) and 67.7% no longer smoke. 43.3% of respondents have never smoked or have already quit smoking (24.4%).

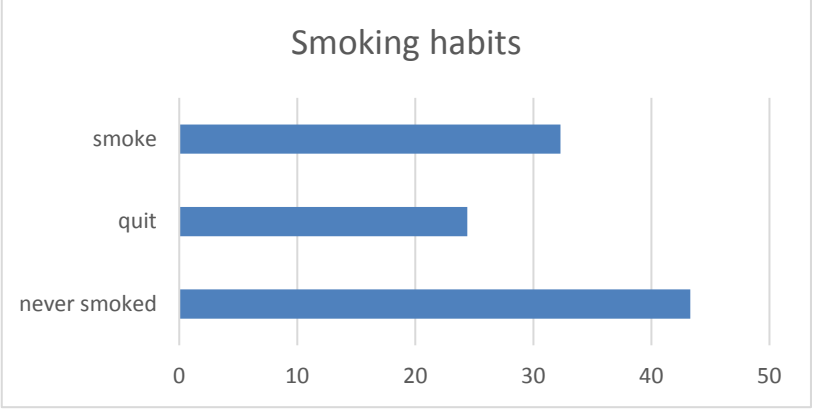

Figure 5. Smoking habits Dohányzási szokások (edited by the authors)

Regarding alcohol consumption habits (Figure 6), almost 70% of respondents (69.8%) drink alcohol a few of times a month. Almost one-fifth (19.4%) of respondents never drink alcohol, while 1.2% drink alcohol four times a week.

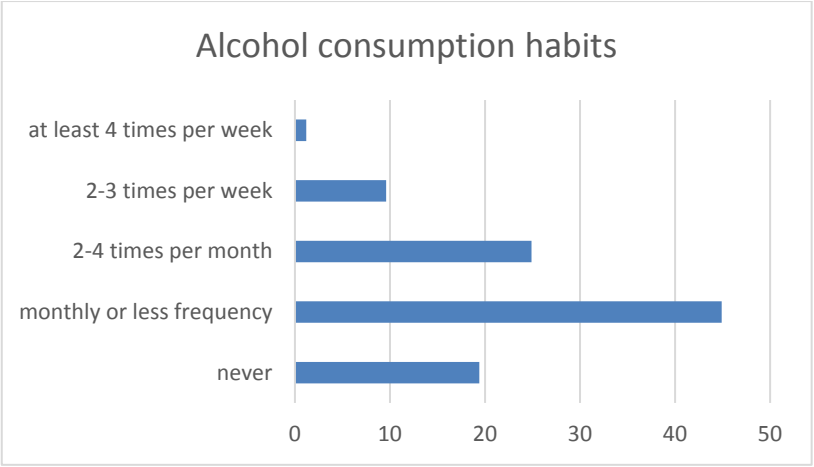

Figure 6. Alcohol consumption habits (edited by the authors)

In terms of sports and physical activity (Figure 7, Figure 8), a third of the respondents do sports several times a week, so more than half of the respondents do sports on a weekly basis. Slightly more than half of respondents (54.6%) do physical activity several times a week, while more than a third do it at least once a week (36.5%).

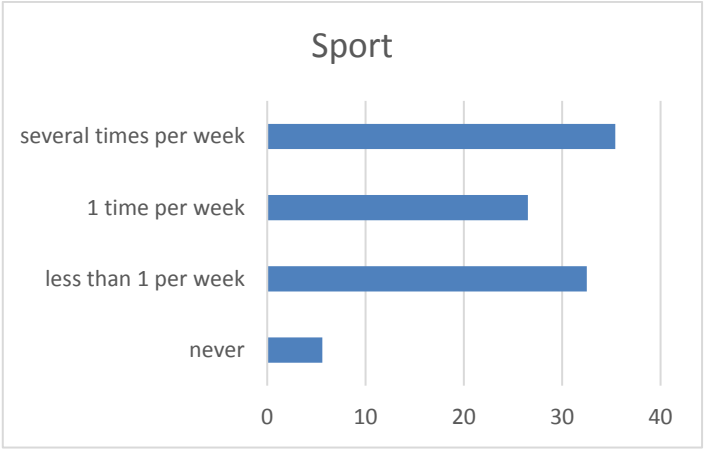

Figure 7. Sport activity (edited by the authors)

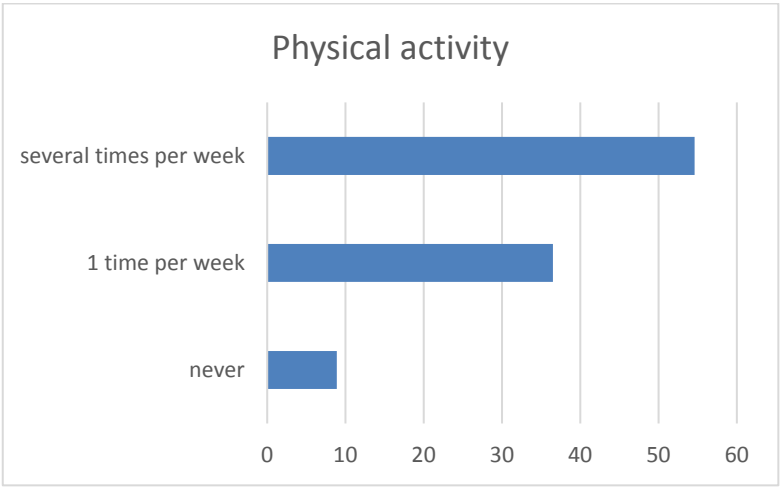

Figure 8. Physical activity (edited by the authors)

The results show that 63.4% of respondents try to pay attention to their diet (Figure 9). 29.2% and 6.7% sometimes or never pay attention to it.

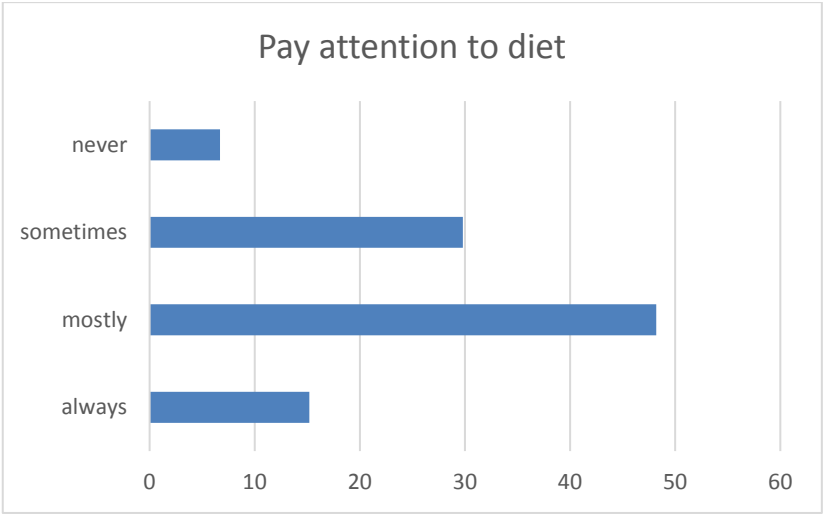

Figure 9. Pay attention to diet (edited by the authors)

The majority of respondents do not follow a special diet (95.1%) and more than half of them do not take any nutritional supplements (62.1%) (Figure 10, 11)/

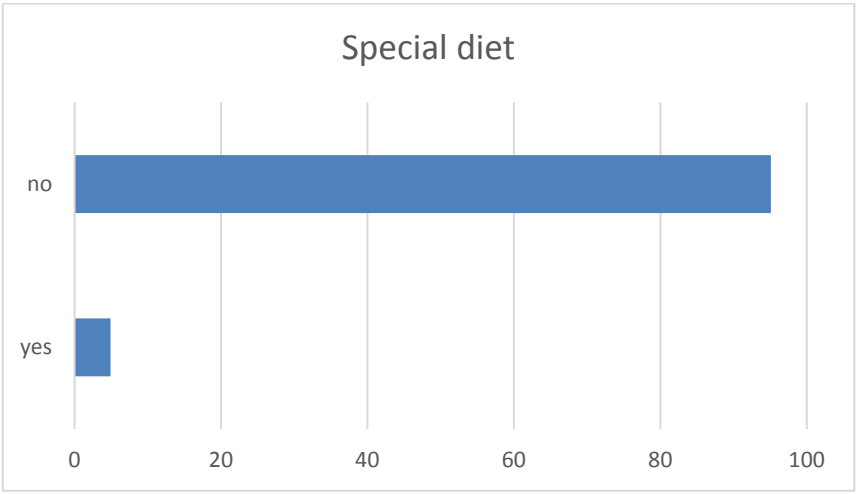

Figure 10. Special diet (edited by the authors)

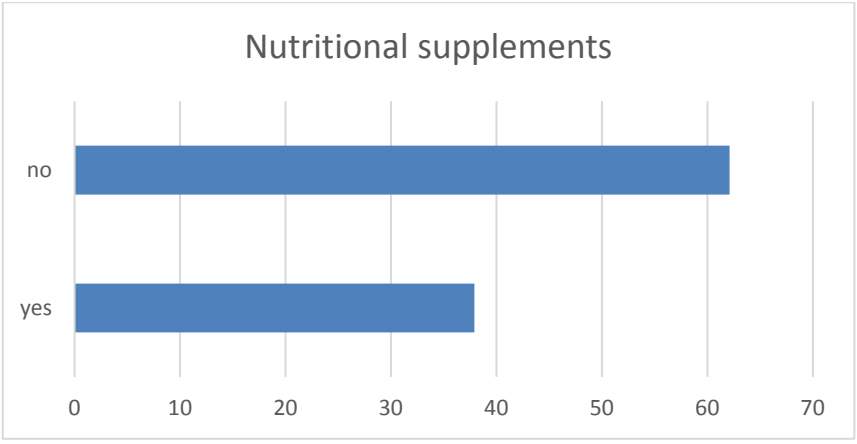

Figure 11. Nutritional supplements (edited by the authors)

In the social support questionnaire, based on the frequency of mention (Table 1) parents, co-workers, friends as possible support were mentioned most often in the questionnaire (1582 – 1549 – 1535), while the co-habiting partner was mentioned the least often (562). The spouse represented the highest average value (M=2.81; SD=±0.66), then the child (M=2.65; SD=±0.79) and the friend (M=2.59; SD=±0.62). The lowest was represented by the church group (M=0.81; SD=±0.94). Comparing the frequency of mention and the average of the strength of support, it can be seen that both values are high for

parents and friends, meaning they are available and respondents can count on their support. In the case of the spouse and the child, the mention frequency is lower compared to the previous ones, but the support is stronger, while in the case of the co-worker and relative, social support is weaker. The frequency of mentioning the co-worker is in third place (89.30%), but the strength of the support is lower (M=2.14; SD=±0.66).

Table 1. Social support (edited by the authors)

Social support	mention frequency		M	SD
	n	%		
1. parents	1582	92,03	2,57	0,83
2. spouse	1253	72,89	2,81	0,66
3. partner	562	32,69	2,24	1,25
4. grandparents	747	43,46	1,60	1,31
5. schoolmate	658	38,28	0,96	1,02
6. neighbour	1284	74,69	1,54	0,94
7. co-workers	1535	89,30	2,14	0,66
8. friends	1549	90,11	2,59	0,62
9. child	1206	70,16	2,64	0,79
10. relatives	1445	84,06	2,05	0,84
11. helper	807	46,95	0,98	0,94
12. church group	814	47,35	0,81	0,94
13. civilian group	842	48,98	0,86	0,96

Based on the HOS questionnaire results (Table 2), respondents gave the highest scores on the Health-esteem and Confidence scale (M=19.83; SD=3.58), indicating that they care about and trust their physical fitness and its durability. The Internal Health Controll scale is the second highest (M=19.06; SD=3.72), according to which individuals rate highly their personal control over influencing their own health. Closely related to this is the third highest mean score item, the Health Expectations scale (M=18.79; SD=3.70), that is, the belief that one's health will remain excellent and stable in the future. The scales with the lowest mean scores are Health Anxiety scale(M=8.84; SD=3.23) and Health Image Concern scale (M=9.73; SD=3.99), that is, anxiety about their health is low and they feel little concern about what others think about their health.

Table 2. HOS (edited by the authors)

	n	M	SD
1. Personal Health Consiousness (PHC)	1668	17,81	3,54
2. Health Image Concern (HIC)	1669	9,73	3,99
3. Healt Anxiety (HA)	1668	8,84	3,23
4. Health-esteem and Confidence (HEC)	1670	19,83	3,58
5. Motivation to Avoid Unhealthiness, (MAU)	1666	17,22	4,07
6. Motivation for Healthiness (MFH)	1667	16,77	3,65
7. Internal Health Controll (IHC)	1668	19,06	3,72
8. Externall health Control (EHC)	1671	10,39	3,19
9. Health Expectations (HE)	1665	18,79	3,70
10. Health Status (HS)	1668	18,27	3,40

Comparison of those treated and not treated for hypertension

1,501 people were not treated for hypertension, and 196 people were treated for hypertension. The prevalence of hypertension increases significantly with age (U=80774.5; Z=-10.199; p=0.000) 87.9% of the respondents (n=1467) were men, 13.8% were women (n=235) (Table 3). 87.9% of men are not treated with hypertension, 12.1% have high blood pressure. In the case of women, 92.3% are not treated for hypertension, and 7.7% of female respondents have hypertension. 90.8% of those treated for hypertension are male and 9.2% are female, so 1.1% (n=18) of all respondents treated for hypertension are female, while 10.5% (n=178) treated for hypertension are male. The results show that the difference between genders is significant ($\chi 2$= 3.979; p=0.047). Men are more likely to be treated for hypertension.

Table 3. Gender distribution and hypertension (edited by authors)

Gender	Prevalence in the total sample n (%)	Not treated with hypertension n (%)	Treated with hypertension n (%)
male	1467 (87,9)	1289 (87,9)	178 (12,1)
female	235 (13,8)	217 (92,3)	18 (7,7)

In terms of educational attainment (Table 4), the highest prevalence of hypertension was among those with a secondary school certificate (18.8%). The lowest prevalence was among Msc education (9.1%). Educational attainment was significantly associated with hypertension ($\chi 2$=17.013; p=0.004).

Table 4. Hypertension and educational attainment (edited by authors)

Level of education	Prevalence in the total sample n (%)	Not treated with hypertension n (%)	Treated with hypertension n (%)
secondary school	250 (14,54	203 (81,2)	47 (18,8)
police post-secondary school	775 (45,08)	693 (90,2)	75 (9,8)
BA degree	432 (25,13)	383 (89,1)	47 (10,9)
MSc degree	154 (8,96)	90,9% (n=140)	14 (9,1)

According to the length of time in service (Table 5), there are no people with hypertension among those with less than 6 years of service. The proportion of people with hypertension increases continously with length of service, with the highest proportion (21.4%) among those with more than 30 years of service. The level of significance between length of time in service and hypertension is very strong ($\chi 2=83.204$; $p=0.000$).

Table 5. Correlation of length of time in service and hypertension (edited by authors)

Length of time in service	Prevalence in the total sample n (%)	Not treated with hypertension n (%)	Treated with hypertension n (%)
0-5 years	136 (7,91)	1,6 (100)	0 (0,0)
6-10 years	206 (11,98)	194 (94,6)	11 (5,4)
11-15 years	261 (15,18)	248 (96,9)	8 (3,1)
16-20 years	381 (22,16)	332 (87,7)	48 (12,6)
21-25 years	339 (19,72)	272 (80,7)	65 (19,3)
26-30 years	180 (10,47)	142 (79,3)	37 (20,7)
31+	70 (4,07)	55 (78,6)	15 (21,4)

Regarding work schedule, around 11% of those working in command and shift work have high blood pressure (Table 6), which makes the proportion slightly lower among those working in the office work schedule. The probability of high blood pressure is the highest among those working in the Shift 2 work schedule (23.8%). According to statistical indicators ($\chi 2=3.692$; $p= 0.299$) there is no correlation between hypertension and work schedule.

Table 6. Correlation of work schedule and hypertension (edited by authors)

Work schedule	Prevalence in the total sample n (%)	Not treated with hypertension n (%)	Treated with hypertension n (%)
official	147 (8,55)	133 (90,5)	14 (9,5)
command	911 (53,00)	804 (88,4)	105 (11,6)
shift 1. 1 (12/24)	342 (19,90)	301 (88,5)	39 (11,5)
shift 2. 2 (24/48)	21 (1,22)	16 (76,2)	5 (23,8)

Regarding smoking habits (Table 7), the distribution of smoking habits between hypertensives and those not treated for hypertension is similar, around 10%. According to the measured indicators, smoking habits are not related to the frequency of hypertension ($\chi 2=1.442$; $p= 0.486$).

Table 7. Smoking habits and hypertension

Smoking habits	Prevalence in the total sample n (%)	Not treated with hypertension n (%)	Treated with hypertension n (%)
never	733 (43,3)	87,7% (n=643)	12,3% (n=90)
quit	413 (24,4)	90,1% (n=372)	9,9% (n=41)
smoke	546 (32,3)	88,5% (n=483)	11,5% (n=63)

We found the highest number of respondents treated for hypertension (17.2%) among those who drink alcohol 2 or 3 times a week. (Table 8). It is definitely remarkable that there are people treated for hypertension who consume alcohol at least four times a week. Regarding alcohol, the correlation between hypertension and alcohol consumption frequency is not significant, either ($\chi 2=6.198$; $p=0.174$).

Table 8. Correlation of alcohol consumption and hypertension (edited by authors)

Alcohol consumption habits	Prevalence in the total sample n (%)	Not treated with hypertension n (%)	Treated with hypertension n (%)
never	329 (19,4)	293 (89,1)	36 (10,9)
monthly or less frequemtly	763 (44,9)	683 (89,5)	80 (10,5)
2-4 times per month	24,9 (423)	375 (88,7)	48 (11,3)
2-3 times per week	163 (9,6)	135 (82,8)	28 (17,2)
at least 4 times per week	20 (1,2)	17 (85,0)	3 (15,0)

In terms of doing sport and physical activity (Tables 9 and 10), the smallest number of people treated for hypertension comes from those who exercise several times a week (8.8%). The biggest number of people treated for hypertension (15.0%) is from among those who exercise less often than once a week. The results indicate a significant relationship ($\chi 2=11.129$; $p= 0.011$).

The physical activity of those treated and not treated with hypertension is similar, but the responses are not significantly related to hypertension ($\chi 2=2.956$; $p= 0.229$).

Table 9. Doing sport

Sports	Prevalence in the total sample n (%)	Not treated with hypertension n (%)	Treated with hypertension n (%)
never	95 (5,6)	84 (88,4)	11 (11,6)
less than 1 per a week	553 (32,5)	470 (85,0)	83 (15,0)
1 times per a week	450 (26,5)	401 (89,1)	49 (10,9)
several times per a week	602 (35,4)	549 (91,2)	53 (8,8)

Table 10. Correlation of physical activity and hypertension (edited by authors)

Physical activity	Prevalence in the total sample n (%)	Not treated with hypertension n (%)	Treated with hypertension n (%)
never	151 (8,9)	140 (92,7)	11 (7,3)
1 times per a week	620 (36,5)	547 (88,2)	73 (11,8)
several times per a week	929 (54,6)	817 (87,9)	112 (12,1)

Among those who do not pay attention to their diet, the lowest rate is from those treated for hypertension (7.9%). (Table 11) Among those who always and most often pay attention to diet, the proportion with hypertension is 10.8% and 11.6%, respectively. The highest is among those who sometimes pay attention to their diet (12.6%). The statistical values show no significant correlation ($\chi 2=2.205$; $p= 0.532$).

Table 11. Attention to diet and hypertension (edited by authors)

Attention to diet	Prevalence in the total sample n (%)	Not treated with hypertension n (%)	Treated with hypertension n (%)
always	259 (15,2)	231 (89,2)	28 (10,8)
mostly	819 (48,2)	724 (88,4)	95 (11,6)
somtimes	507 (29,8)	443 (87,4)	64 (12,6)
never	114 (6,7)	105 (92,1)	9 (7,9)

For special diets and nutritional supplements (Tables 12 and 13), no significant value was found ($\chi2=1.003$; $p=0.343$; $\chi2=0.014$; $p=0.936$). There are similar proportions of hypertensives between those who did or did not follow special diets and between those who did or did not take supplements.

Table 12. Special diet and hypertension (edited by authors)

Special diet	Prevalence in the total sample n (%)	Not treated with hypertension n (%)	Treated with hypertension n (%)
yes	74 (4,9)	63 (85,1)	11 (14,9)
no	1425 (95,1)	1267 (88,9)	158 (11,1)

Table 13. Special diet and hypertension (edited by authors)

Nutritional supplements	Prevalence in the total sample n (%)	Not treated with hypertension n (%)	Treated with hypertension n (%)
yes	625 (37,9)	553 (88,5)	72 (11,5)
no	1024 (62,1)	908 (88,7)	116 (11,3)

In relation to social support (Table 14), there is a significant difference in support from grandparents ($p=0.002$) and parents ($p=0.012$) between hypertensives and non-hypertensives. Those with hypertension perceive less support from these two groups.

Table 14. Correlation of social support and hypertension (edited by authors)

	n	M	SD	U	Z	p
1 parents	1570	2,57	0,83	125864,50	-2,500	0,012
Not treated with hypertension	1396	2,60	0,80			
Treated with hypertension	174	2,40	0,99			
2 spouse	1242	2,81	0,66	97290,50	-0,135	0,911
Not treated with hypertension	1085	2,80	0,66			
Treated with hypertension	157	2,80	0,67			
3 partner	556	2,24	1,25	12790,50	-1,570	0,121
Not treated with hypertension	499	2,27	1,2			
Treated with hypertension	57	1,96	1,41			
4 grandparents	737	1,60	1,31	17852,50	-3,101	0,002
Not treated with hypertension	669	1,65	1,30			
Treated with hypertension	68	1,13	1,31			
5 schoolmate	651	0,96	1,02	19825,50	-1,008	0,315
Not treated with hypertension	586	0,98	1,03			
Treated with hypertension	65	0,81	0,88			

	n	M	SD	U	Z	p
6 neigbour	1274	1,54	0,94	84444,00	-0,086	0,933
Not treated with hypertension	1123	1,54	0,95			
Treated with hypertension	151	1,54	0,84			
7 co-workers	1522	2,14	0,66	11484,50	-0,744	0,456
Not treated with hypertension	1346	2,15	0,66			
Treated with hypertension	176	2,10	0,70			
8 friends	1537	2,59	0,62	109746,00	-1,800	0,073
Not treated with hypertension	1364	2,59	0,63			
Treated with hypertension	173	2,53	0,59			
9 child	1194	2,64	0,79	80556,00	-0,607	0,544
Not treated with hypertension	1035	2,64	0,80			
Treated with hypertension	159	2,71	0,68			
10 relatives	1432	2,05	0,84	80556,00	-0,607	0,871
Not treated with hypertension	1266	2,05	0,84			
Treated with hypertension	166	2,06	0,84			
11 helper	800	0,98	0,94	30541,00	-0,564	0,574
Not treated with hypertension	711	0,99	0,94			
Treated with hypertension	89	0,93	0,95			
12 church group	805	0,81	0,94	31689,5	-0,253	0,801
Not treated with hypertension	715	0,81	0,93			
Treated with hypertension	90	0,85	1,00			
13 civilian group	833	0,96	0,96	33495,50	-0,459	0,450
Not treated with hypertension	738	0,85	0,96			
Treated with hypertension	95	0,92	0,95			

Health Orientational Questionnaire (HOS) (Table 15) questionnaire results show that people without hypertension have higher personal health consciousness (p=0001), as well as higher health-related self-esteem (p=0.000). They are more motivated to avoid unhealthiness (p=0.002) and to preserve their health (p=0.009). They feel in a better state of health (p=0.000) and are confident that this will be maintained in the future (p=0.000). Hypertension patients have higher health concerns (p=0.045). They have higher levels of both internal and external health control (p=0.000; P=0.001) and health anxiety (p=0.000).

Table 15. Correlation of HOS and hypertension (edited by authors)

	n	M	SD	U	Z	p
1 Personal Health Consiousness (PHC)	1668	17,81	3,54	120770,00	-3,346	0,001
Not treated with hypertension	1476	17,91	3,55			

	n	M	SD	U	Z	p
Treated with hypertension	192	17,08	3,30			
2 Health Image Concern (HIC)	1669	9,73	3,99	129436,00	-1,980	0,045
Not treated with hypertension	1477	9,68	4,01			
Treated with hypertension	192	10,18	3,87			
3 Healt Anxiety (HA)	1668	8,84	3,23	110498,50	-5,006	0,000
Not treated with hypertension	1476	83,69	3,15			
Treated with hypertension	192	10,02	3,59			
4 Health-esteem and Confidence (HEC)	1670	19,83	3,58	101347,00	-6,6-565	0,000
Not treated with hypertension	1477	20,06	3,49			
Treated with hypertension	193	18,17	3,74			
5 Motivation to Avoid Unhealthiness, (MAU)	1666	17,22	4,07	120897,00	-3,105	0,002
Not treated with hypertension	1476	17,33	4,10			
Treated with hypertension	190	16,42	3,73			
6 Motivation for Healthiness (MFH)	1667	16,77	3,65	124598,50	-2,623	0,009
Not treated with hypertension	1476	16,86	3,66			
Treated with hypertension	191	16,18	3,44			
7 Internal Health Controll (IHC)	1668	19,06	3,72	115875,50	-4,034	0,000
Not treated with hypertension	1477	19,21	3,72			
Treated with hypertension	191	18,15	3,56			
8 Externall health Control (EHC)	1671	10,39	3,19	120619,00	-3,506	0,001
Not treated with hypertension	1478	10,30	3,18			
Treated with hypertension	193	11,14	3,21			
9 Health Expectations (HE)	1665	18,79	3,70	98458,00	-6,702	0,000
Not treated with hypertension	1475	19,01	3,65			
Treated with hypertension	190	17,05	3,66			
10 Health Status (HS)	1668	18,27	3,40	105671,00	-5,851	0,000
Not treated with hypertension	1475	18,46	3,35			
Treated with hypertension	174	2,4	0,99			

Characteristics of people treated for hypertension

Overall (Table 16; Figure 12), 11.5% (n=196) of the respondents were treated for hypertension, of which 90.8% were men. Most of them have secondary education qualificatins (66.7%). In terms of length of service, there are few who have been in the workforce for less than 16 years (10.3%). The highest number of them (35.3%) have between 21 to 25 years of service.

More than half (64.4%) of people with hypertension work on command work schedule. The proportion of smokers is 32.5%, and 67.5% are currently non-smokers. Regarding alcohol consumption, the biggest proportion (41.0%) drink alcohol monthly or less often. 52.0% exercise weekly, the other respondents less often than once a week or never. The proportion who never do any other physical activity is 5.6%. 32.7% do physical activity every week, and 57.1% several times a week.

The proportion of those who always pay attention to their diet is 14.3%, but 48.5% of those treated for hypertension pay attention to this most of the time. The overall proportion of those who sometimes (32.7%) or never (4.6%) pay attention to their meals is 37.3%. Typically, they are not on a special diet (93.5%) and do not take any nutritional supplements (61.7%).

We found a significant difference for gender, educational level and length of time in the workforce. When examining the relationship between social support and hypertension, we found a significant difference between grandparents and parents (p=0.002; p=0.012). Those with hypertension were less likely to rely on parental and grandparental support.

Table 16. Characteristics of people treated for hypertension (edited by authors)

Gender	frequency n (%)
male	178 (90,8)
female	18 (9,2)
Level of education	
secondary school	47 (25,7)
police post-secondary school	75 (41,0)
BA degree	47 (25,7)
MSc degree	14 (0,9)
Length of service	
0-5 years	0
6-10 years	11 (6,0)
11-15 years	8 (4,3)
16-20 years	48 (26,1)

Alcohol consumption	
never	36 (18,5)
monthly or less frequently	80(41,0)
2-4 times per month	48 (24,6)
2-3 per week	28 (14,4)
at least 4 times per weekHetente 4-szer	3(1,5)
Sport	
never	11 (5,6)
less than 1 per week	83 (42,3)
1 time per week	49 (25,0)
several times per week	53 (27,0)
Physical activity	
never	11 (5,6)
1 time per week	73 (32,7)
several time per week	112 (57,1)

21-25 years	65 (35,3)	Pay attention to diet	
26-30 years	37 (20,1)	always	28 (14,3)
30+ years	15 (8,2)	mostly	95 (48,5)
Work schedules		sometimes	64 (32,7)
office	14 (8,6)	never	9 (4,6)
command	105 (64,4)	Special diet	
shift 1	39 (23,9)	yes	11 (6,5)
shift 2	5 (3,1)	no	158 (93,5)
Smoking		Nutritional supplements	
never smoked	90(46,4)	yes	72 (38,3)
quit	41 (21,1)	no	116(61,7)
smoke	63 (32,5)		

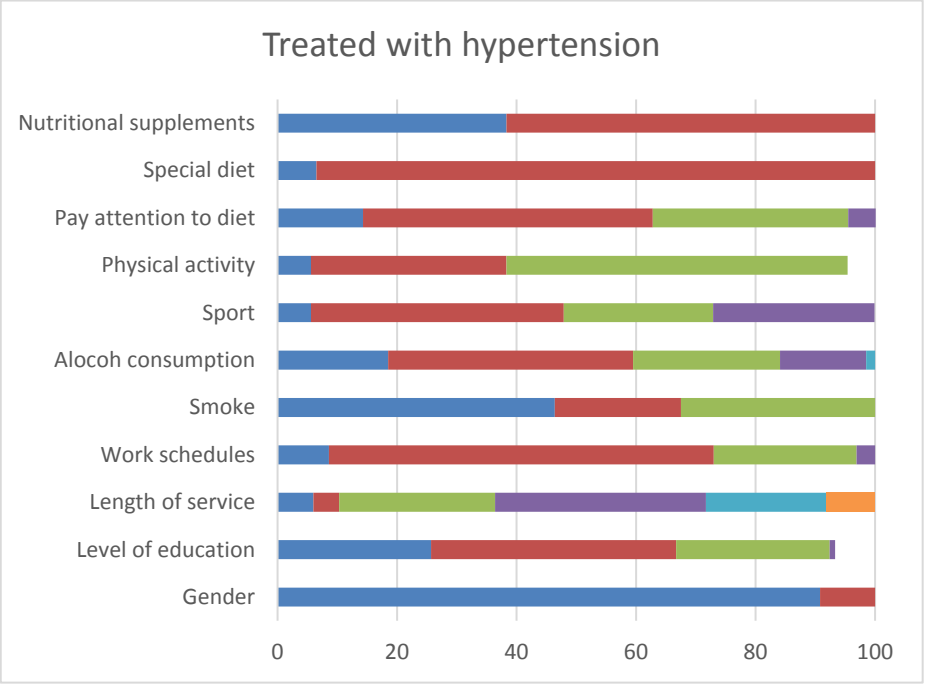

Figure 12. Characteristics of people treated with hypertension

DISCUSSION

Looking at the sociodemographic data of law enforcement officers, males are present in a higher proportion than females in the sample. The prevalence of hypertension is significantly higher among males. The prevalence

of developing hypertension increases with age, which is also confirmed by the significant value for age, and is probably the reason why the development of hypertension is strongly associated with length of service.

In terms of educational level, the highest proportion is given by those who graduated from the law enforcement school, which also showed a significant association with high blood pressure. More than half of the staff work on a command work schedule, and although a correlation with hypertension could be assumed, no significant correlation was found.

For lifestyle factors, no differences were found between those treated and untreated for hypertension in smoking and alcohol consumption. In terms of physical activity, almost half of hypertensives (47.9%) exercise less often than once a week, and as the proportion of physical activity is similar and the proportion of sport is smaller, it is likely that hypertensives do less daily physical activity.

In the case of social support, there was a significant difference in support from parents and grandparents, which may be due to the loss of parental or grandparental support as age advances.

In terms of health motivation, they seem to have higher health concern and anxiety, but they lack real action. They are neither motivated to avoid ill health nor to maintain their health, despite being more pessimistic about their health. There is no significant difference in lifestyle between those treated for hypertension and those not treated, and even less activity characterizes those treated for hypertension.

A diagnosis of hypertension alone is not enough to change behavior, it is necessary to raise awareness of the importance of a healthy lifestyle and to develop strategies to encourage behavior change and to assess knowledge about healthy lifestyles. Ijzelenberg (2012) also draws attention to the fact that lifestyle improvement programs are very useful, even with appropriate treatment, as a comprehensive lifestyle intervention has a beneficial effect on cardiovascular risk factors.

Limitations

A limitation of the results is that the questionnaire was self-reported. In future studies, it is advisable to link the diagnosis of hypertension to objective data, and to observe the course of medical interventions in already diagnosed cases.

Males are over-represented in the study, but this reflects the gender distribution of police officers. The data are cross-sectional, so it is not possible to know how health behaviours had been changed by the diagnosis of hypertension, or whether they had been present even before that.

The limitations of the survey are that we did not specify which tobacco product we mean by smoking: traditional smoking habits or the use of newer electronic devices? However, data from the 2018 Public Health Survey (Brys, 2022) reveal that the proportion of those who try and use e-cigarettes shows an increasing trend in Hungary.

With regard to sport and physical activity, the possibility of comorbidity was not investigated, which may make it difficult to move. However, it is likely that, as they are employable as law enforcement officers according to their health status, they do not have a major health problem that would really prevent people with hypertension from moving. The "healthy worker effect" (McMichael, 1976) prevails here as well, the survey only includes individuals who are healthy enough to be employed.

We did not examine factors that could lie behind the change in behavior, e.g. financial reasons, health literacy, self-efficacy, taking medication properly and the correlation of hypertension with stress. Taking antihypertensive medication correctly is important because in Hungary, 70% self-reported non-adherence to antihypertensive medication, which increases the risk of adverse health consequences and entails significant health costs (Morrison, 2015).

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