

Health-related behaviours and hypertension prevention in Poland. An environmental study

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Abstract

Introduction: Primary and secondary prevention of hypertension is difficult and if the condition is not treated it may cause a number of dangerous complications. The objective of this study was to collect and systematize data on the health-related behaviours of Poles aiming at the prevention of hypertension in order to determine potential areas where primary health care could be improved.

Material and methods: A group of 1018 participated in the study (60% women and 40% men). The study was conducted in Poland in 2009 by means of an anonymous research questionnaire developed for survey use. The study involved people aged 30-50 years, who had not been diagnosed with hypertension, and who were under the care of a primary care physician.

Results: Over 35% of respondents in the potential risk group do not measure blood pressure at all, and just over 10% perform cholesterol and blood glucose level tests more often than once a year. Individuals who pay most attention to prevention in the form of physical activity are women, more often young (67% of people under 35), unmarried (52%), mostly with secondary or higher education. Moreover, one third of the women surveyed (32.4%) and almost half of men (48.4%) stated that they smoke cigarettes, and in most men (66.3%) the amount of alcohol taken in one serving exceeded the pressor threshold (> 20 g).

Conclusions: Desirable health-promoting actions such as stress reduction are effective but actions such as consuming alcohol and eating fats are unsatisfactory and require intensive public education.

Key words: hypertension, prevention, survey, preventive measures.

Introduction

Chronic diseases are becoming a growing challenge for modern medical care in developed societies. Most of them are associated with disorders in the function of the cardiovascular system. Big-city dwellers are primarily exposed to the occurrence of these diseases.

According to a study conducted in 2006 nearly 42% of the population aged between 35 and 64 years suffered from hypertension (HTN) in Poland and the incidence of the disease increased with age, reaching over 70% of the population of older people [1]. With no disease-specific symptoms, diagnosis of hypertension becomes particularly difficult to make. If not treated, the condition may lead to a number of danger-

ous complications: atherosclerosis, damage of coronary arteries, heart, kidneys and visual system, and in consequence even to death [2, 3].

Pharmacotherapy of this disease, which is only a symptomatic treatment, is a long and costly process for both the patient and the healthcare system. Therefore, lifestyle modification – involving the introduction of appropriate health-promoting behaviours concerning its various aspects, i.e. diet, regular physical activity, overcoming addictions or finding a way to manage stress – is the only promising way to combat this disease as well as the rising costs of hypertension treatment in industrialized countries [4]. Literature reports indicate that a fundamental generational change in health behaviour patterns is currently taking place [5]. However, a study of 2008 [6] evaluating the knowledge of Poles on the prevention of HTN demonstrated that although the knowledge of the patients surveyed was sufficient, it was believed not to be put into practice. These conclusions contributed to undertaking this further research aiming to evaluate the current attitude of patients to HTN prevention.

The purpose of this study was to collect and systematize data on the health-promoting behaviours of Poles towards prevention of HTN.

Material and methods

The study was conducted on 1018 people (60%, $n = 611$ women and 40%, $n = 407$ men). Random-quota sampling was used within the sampling frame of the list of general practitioner clinics that have a contract with the NFZ (National Health Fund) to provide primary care. Every tenth clinic on the list was contacted to obtain GP's consent for the survey study to be carried out in their clinics among the patients under their care and to inform them of the aims and assumptions of the study. Having obtained the consent, a surveyor conducted a one-day survey (within the time limit set by the GP) among the patients who had appointments with the GP on the given day, and who also met the predetermined criteria qualifying them for the survey and agreed to take part in it. Each time a potential subject was advised of the aim of the study, of the institution conducting the research project, of the way the data to be collected would be used, as well as of the voluntary and anonymous character of participating in the survey. With the explicit consent of the potential subject, the surveyor made the research questionnaire available to the patient. Patients completed the questionnaire on their own.

The criteria for including a patient in the study were as follows:

- age between 30 and 50 years,
- no HTN diagnosis,
- being under GP's care,

- inhabiting the city of Poznan (the third largest city in Poland with a population of approx. 560,000) [7],
- knowing consent to participate in the study.

The study was conducted within a period from September to December 2009, by means of a research questionnaire prepared specially for survey use.

The questionnaire was prepared in accordance with the concept of Kornhauser and Sheatley [8]. Twenty people aged 30-50 years, who were not diagnosed with hypertension and who were not related to the field of medicine, participated in the pilot study.

The questionnaire covered multiple areas. The content-related part of the questionnaire consisted of 24 questions divided according to their subject matter into 6 logical batteries of questions with the maximum of 6 questions each. Most of the questions were categorized multiple-choice questions describing health-promoting behaviours of primary care patients within the following batteries: 1. General prevention of hypertension; 2. Prophylaxis to reduce substance use; 3. Nutritional prevention; 4. Prophylaxis in the form of physical activity; 5. Pharmacological prophylaxis; 6. Evaluation and awareness. The questions of the first battery asked patients how often they had their blood pressure measured (q. 1), and their blood cholesterol and glucose levels tested (q. 2), how they managed their body weight (q. 3), how they coped with stress (q. 6) and why they had doctor's appointments within the last year (q. 24). The second battery contained questions about smoking tobacco (q. 4) and drinking alcohol (q. 7, 8 and 9). The third battery contained diet-related questions. Respondents were asked about their behaviours connected with the consumption of salt (q. 5), potassium and magnesium (q. 14), and different kinds of fats (q. 15), as well as about the products they ate most often (q. 18), their consumption of foods lowering blood cholesterol levels (q. 20) and consumption of sweets (q. 23). The fourth battery determined the respondents' frequency of undertaking regular physical exercise (q. 10), the kinds of sports and recreational physical activities they did most often (q. 11), and the frequency of making moderate physical effort (q. 13). The fifth battery comprised questions connected with pharmacotherapy used by patients, including long-term use of painkillers and/or contraceptives (q. 12), as well as preparations or medicines taken prophylactically (q. 21). The sixth battery contained questions asking the respondents to evaluate their lifestyle (q. 16) and health (q. 17), and also to evaluate and compare pharmacological and non-pharmacological therapy effectiveness in selected areas (q. 22). In addition, it included a question testing the respondents' knowledge of HTN risk factors (q. 19).

Questions 1, 2, 3, 5, 7, 10, 13, 21, 23 and 24 were categorized multiple-choice questions. Contingency

questions 7, 21 and 24 led sequentially to more specific questions. Questions 4, 6, 8, 9, 12, 14, 15 and 20 were dichotomous questions. The questionnaire also contained semi-open questions (q. 16, 17), semi-open questions with a verbal scale (q. 22), and multiple choice close-ended questions with a number of options to choose from and a possibility to choose more than one option (q. 11, 18, 19), which were explicitly described as such. Moreover, in questions 11, 19, 21 and 24 it was also possible to add one's own answer that had not been included in the list of options.

At the end of the questionnaire there was a separate section with personal data questions asking about social and demographic data. Demographics were obtained by means of 8 questions about age, sex, marital status, education, number of children, family history of HTN, height and weight. It allowed the researchers to determine a respondent's genetic, demographic and risk-factor predisposition to HTN in the future, that is, whether a respondent is or is not in the high-risk group.

Ethical approval

Patients, having been fully informed of the purpose of the study and the intended use of results, knowingly consented to participation in the scientific research. The study was conducted in compliance with ethical requirements and international environmental research standards with the consent of the relevant committee (Bioethics Committee).

Statistical analysis

The results obtained were subjected to cluster analysis (two-level clustering, ANOVA test, contingency tables showing the percentage composition of 3 selected groups sex, body mass index (BMI), age, education, marital status), which was believed to be the most suitable method for determining whether any specific prevention patterns exist. To that end, Statistica 8 PL package and PASW Statistics 18 were used. Quantitative data were characterized by determining the subgroup size, percentage, mean value for groups with standard deviation, and maximum and minimum values. Data on nominal capacity were described by means of size and proportion. In order to compare different categories of prevention with one another and to perform statistical operations aimed at selecting specific groups, answers were converted by the subjects on the rate scale for each category of prevention. The score was expressed as a percentage according to the principle that the higher the number, the greater the emphasis on the prevention aspect. Body mass index of the respondents was calculated on the basis of weight and height data obtained by means of demographic questions.

Results

The analysis of the data showed that the average age was 38 (women were slightly younger than men – 37.4 ± 6.3 to 39.4 ± 6.3) (Table I). The largest group consisted of married people (over 60%); single people constituted nearly 1/4, with 14.1% of women and 11.5% of men without a partner. Regardless of sex, most people had tertiary or secondary education. No significant asymmetry in the distribution of independent variables (age, education, sex) allowed for a positive evaluation of the selection of the study group.

A BMI analysis of the individuals surveyed showed that the majority (68%) are in the normal body weight category. However, quite a large proportion of men (44.2%) were in the "overweight" category, in which the risk of death due to the development of a cardiovascular disease is slightly increased compared to those with normal body weight (Table I).

General prevention of hypertension

The vast majority of respondents did not measure blood pressure regularly (Table I). The structure of the frequency of blood pressure measurements in relation to sex was similar, with a slightly higher percentage of measuring women. Analysis of the cholesterol and blood glucose testing frequency was used to estimate the parameters describing the state of the circulatory system and allowed estimation of the risk of developing a cardiovascular disease. The vast majority of respondents did not carry out such tests. The vast majority of female respondents and more than half of male respondents attempted to keep their body weight in the normal range (Table I).

Prophylaxis to reduce substance use

One third of the women surveyed (32.4%) and almost half of men (48.4%) stated that they smoke cigarettes (Table II). Alcohol consumption behaviours look even less favourable in the assessment. The results indicate the predominance of spirits consumption over that of beer and wine. It should be stressed that for the vast majority of male respondents (66.3%) the amount of alcohol taken in one serving exceeded the pressor threshold (> 20 g). Considering the frequency of alcohol consumption (prevalence of 2-4 times a week), and the nature and quantity of consumption, it is difficult to speak of subjects' health-promoting behaviours. For women the situation is slightly better, because they rarely exceed the pressor threshold; however, they consume spirits more often, which makes the current situation unsatisfactory and requiring intensification of educational activities in this scope.

Table I. Socio-demographic data of respondents, BMI and measurement of blood pressure, cholesterol and glucose levels and maintenance of normal body weight

Parameter	Women (n = 611)		Men (n = 407)	
	Frequency	Percentage	Frequency	Percentage
Age [years]				
Mean and SD	37.4 ±6.3		39.4 ±6.3	
30-35	260	42.6	114	28.0
36-40	146	23.9	102	25.1
41-45	92	15.1	84	20.6
46-50	113	18.4	107	26.3
BMI [kg/m ²]				
Mean and SD	22.7 ±3.3		25.1 ±2.9	
Min and max	15.6	59.5	18.5	47
< 18.50	33	5.4		
18.50-24.99	480	78.6	212	52.1
25.00-29.99	83	13.6	180	44.2
30.00-34.99	11	1.8	12	2.9
35.00-39.99	3	0.5	1	0.2
> 40.00	1	0.2	2	0.5
Blood pressure measurement				
No	206	33.7	163	40.0
Several times a year	65	10.6	45	11.1
1-2 times per month	142	23.2	82	20.1
1-2 times per week	198	32.4	117	28.7
Measurement of cholesterol and glucose levels				
No	316	51.7	252	61.9
Less than once a year	103	16.9	56	13.8
Once a year	119	19.5	51	12.5
More than once a year	73	11.9	48	11.8
Total	611	100.0	407	100.0
Normal body weight maintenance				
Care for normal body weight	462	75.6	231	56.8

Nutritional prevention

Further analysis of the respondents' behaviours demonstrated that men's diet contains more calories and less fibre because men eat far less fruit and vegetables. The key point is the fact that animal fats predominate in the diet of both sexes, but it is also worth noting that 43.4% of women and 26.3% of men eat various kinds of cholesterol-lowering foods (e.g. margarine containing plant sterols). Furthermore, women eat considerably more sweets than men.

Another important element of HTN prevention is to reduce the amount of salt in the diet, which was a behaviour reported by 1/3. More than half of the respondents indicated that they try not to over-

use it (Table II). The result obtained indicates that only a small part of Polish society (on average approximately 15%) does not attribute any importance to this, which should be considered to be a positive phenomenon.

Prophylaxis in the form of physical activity

It may be concluded from Table III and Figure 1 that most Poles rarely take physical exercise. Only 14.2% of women and 18.4% of men exercise regularly, at least twice a week. The most popular activities undertaken by the respondents include going for walks (70%) and cycling (almost 60%). Taking physical activity into account, most respondents assessed their own lifestyle as moderately active,

Table II. Cigarette smoking, alcohol consumption and essential elements of the diet from the point of view of HTN prevention

Parameter	Women		Men	
	Frequency	Percentage	Frequency	Percentage
Cigarette smoking	198	32.4	197	48.4
Alcohol consumption				
No	90	14.7	38	9.3
Occasionally	258	42.2	90	22.1
2-4 times a month	184	30.1	124	30.5
2-4 times a week	76	12.4	128	31.4
Daily	3	0.5	27	6.6
Alcohol units on a single occasion				
< 20 g	369	60.4	137	33.7
> 20 g	242	39.6	270	66.3
Type of alcohol				
Beer, wine	221	36.2	184	45.2
Spirits	390	63.8	223	54.8
Salt in the diet				
Limiting the amount of salt	321	52.5	213	52.3
Avoiding salty foods	216	35.4	114	28.0
Potassium and magnesium				
A diet rich in potassium and magnesium	537	87.9	291	71.5
Type of fat consumed				
Vegetable	272	44.5	137	33.7
Animal	339	55.5	270	66.3
Cholesterol-lowering products	265	43.4	107	26.3
Consumption of sweets				
No	51	8.3	36	8.8
Little	300	49.1	237	58.2
Much	260	42.6	134	32.9
Total	611	100.0	407	100.0

with a predominance of moderate exercise performed 4-6 times a week. Irrespective of this, most respondents (of both sexes) assessed their health as satisfactory. The study also shows that over 75% of patients manage to cope with chronic stress accompanying their daily lives, which greatly reduces the risk of HTN development in these patients.

Pharmacological prophylaxis

Thirty-eight percent of women take contraceptives/painkillers and 11.5% of men take painkillers on a long-term basis. Approximately 30% of respondents take medications prophylactically, most often choosing dietary minerals, herbal

preparations and products containing ω -3 fatty acids (Table IV). At the same time it should be noted that although in the opinion of patients non-pharmacological therapy is safer, a therapy involving the use of drugs is considered to be more effective (Figure 2). In terms of the frequency of visits to various doctors, the respondents most often go to the doctor for preventive examinations, and secondly because of a sudden illness. Less than 7% of respondents see a doctor for HTN prophylaxis (Table IV).

The results in the prophylaxis scales with regard to the allocation criteria sex, education, BMI levels and health status assessment revealed slight differences in the profiles of different groups of people. Prevention in the form of physical activity was

Table III. Physical activity and self-assessment of respondents on their lifestyle and state of health, stress management and moderate physical activity

Parameter	Women		Men	
	Frequency	Percentage	Frequency	Percentage
Physical activity				
None	63	10.3	49	12.0
Rarely	279	45.7	181	44.5
Sometimes	182	29.8	102	25.1
Regularly	87	14.2	75	18.4
Lifestyle assessment				
Passive	102	16.7	95	23.3
Medium-active	425	69.6	231	56.8
Active	84	13.7	81	19.9
State of health assessment				
Bad	10	1.6	3	0.7
Unsatisfactory	57	9.3	40	9.8
Satisfactory	327	53.5	234	57.5
Good	217	35.5	130	31.9
Effective stress management				
Lack of stress or having an effective method of stress management	465	76.1	320	78.6
Moderate physical activity				
Never	–	–	5	1.2
Several times a year	11	1.8	24	5.9
4-6 times a week	33	5.4	27	6.6
Once a week	70	11.5	95	23.3
2-3 times a week	210	34.4	105	25.8
4-6 times a week	287	47.0	151	37.1
Total	611	100.0	407	100.0

emphasised in all scales. The only interesting result obtained in these scales was increased prevention within the scope of reduction of substances used by people with a BMI above 30 kg/m².

In an attempt to answer the question whether there are any specific patterns of preventive health care, cluster analysis was performed, which singled out three groups with the following prevention profiles and characteristics: group 1 – little care for prevention; 2 – care for prophylaxis in the form of physical activity; and 3 – increased concern for substance use reduction, as well as nutritional and pharmacological prophylaxis (Figure 3).

The percentages of individuals within a particular cluster with respect to qualitative variables are presented in Table V. Despite attempts to identify a specific prevention pattern no other regularity was confirmed other than the one that prevention in the form of physical activity is the most common one whereas pharmacological prevention

is the least used. Individuals who pay most attention to prevention in the form of physical activity are women, more often young (67% of people under 35), unmarried (52%), mostly with second-

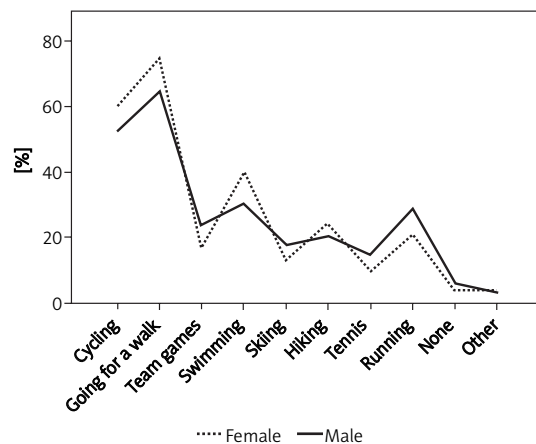


Figure 1. Sport and recreational activities undertaken by the respondents in free time

Table IV. Respondents' reasons for doctor visits over the last year

Parameter	From response		Percentage of the persons being surveyed	Women		Men	
	n	Percentage		n	Percentage	n	Percentage
Reason for a visit							
No visits	141	11.4	13.9	75	12.3	66	16.3
Sudden illness	361	29.3	35.5	194	31.8	167	41.2
Chronic disease	117	9.5	11.5	65	10.6	52	12.8
Prophylaxis	614	49.8	60.4	411	67.3	203	50.1
If prevention, then							
HTN prevention (GP, cardiologist)	70	6.7	11.3	22	5.3	48	23.4
Ophthalmologist	239	22.8	38.7	169	41.0	70	34.1
Gynaecologist	295	28.1	47.8	287	69.7	8	3.9
Dentist	366	34.9	59.3	233	56.6	133	64.9
Other	80	7.6	13.0	60	14.6	20	9.8
Medications used prophylactically							
Microelements	196	29.6	65.1	125	63.1	71	68.9
Slimming pills	32	4.8	10.6	27	13.6	5	4.9
Preparations containing red wine extract	20	3.0	6.6	18	9.1	2	1.9
Preparations containing coenzyme Q10	78	11.8	25.9	71	35.9	7	6.8
Preparations containing omega 3 fatty acids	115	17.3	38.2	77	38.9	38	36.9
Cholesterol-lowering preparations	49	7.4	16.3	29	14.6	20	19.4
Herbal preparations	118	17.8	39.2	86	43.4	32	31.1
Anti-infarct drugs	32	4.8	10.6	14	7.1	18	17.5
Other	23	3.5	7.6	16	8.1	7	6.8
Total	663	100.0	220.3	198		103	

ary (33%) or higher (29%) education, most of them with a BMI below 18.5 kg/m². Men represent a homogeneous group (all in cluster 1) regularly

obtaining lower scores than women on all scales of prevention.

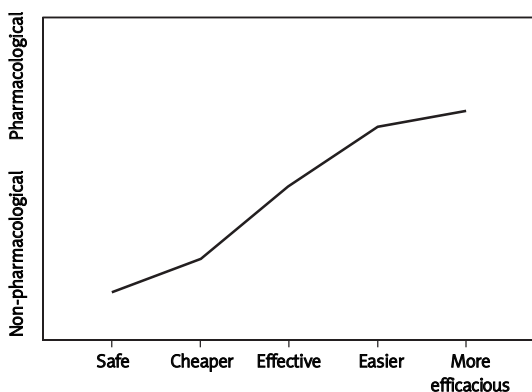


Figure 2. Evaluation of non-pharmacological and pharmacological therapy

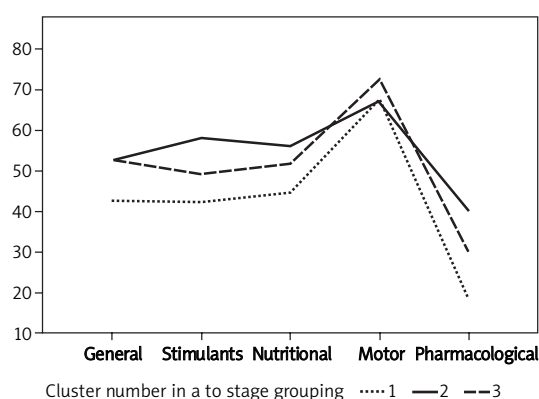


Figure 3. Prophylaxis profiles in three singled-out groups

Table V. Percentage composition of singled-out clusters with reference to sex, BMI, education, age, marital status

Cross table		Cluster number in the two-stage grouping			Total
		1	2	3	
Sex*					
Female	<i>n</i>	1	330	280	611
	%	0.2	54.0	45.8	100
Male	<i>n</i>	407	0	0	407
	%	100	0.0	0.0	100
BMIs2* [kg/m ²]					
< 18.50	<i>n</i>	0	6	27	33
	%	0.0	18.2	81.8	100
18.50-24.99	<i>n</i>	212	246	234	692
	%	30.6	35.5	33.8	100
25.00-29.99	<i>n</i>	180	65	18	263
	%	68.4	24.7	6.8	100.0
≥ 30	<i>n</i>	16	13	1	30
	%	53.3	43.3	3.3	100.0
Education*					
Primary	<i>n</i>	5	7	2	14
	%	35.7	50.0	14.3	100.0
Vocational	<i>n</i>	73	45	2	120
	%	60.8	37.5	1.7	100.0
Secondary	<i>n</i>	148	132	139	419
	%	35.3	31.5	33.2	100.0
Higher	<i>n</i>	182	146	137	465
	%	39.1	31.4	29.5	100.0
Age (divided)* [years]					
30-35	<i>n</i>	114	8	252	374
	%	30.5	2.1	67.4	100.0
36-40	<i>n</i>	103	120	25	248
	%	41.5	48.4	10.1	100.0
41-45	<i>n</i>	84	92	0	176
	%	47.7	52.3	0.0	100.0
46-50	<i>n</i>	107	110	3	220
	%	48.6	50.0	1.4	100.0
Marital status*					
Unmarried	<i>n</i>	100	16	130	246
	%	40.7	6.5	52.8	100.0
Married	<i>n</i>	261	236	142	639
	%	40.8	36.9	22.2	100.0
Single	<i>n</i>	47	78	8	133
	%	35.3	58.6	6.0	100.0
Total	<i>n</i>	408	330	280	1018
	%	40.1	32.4	27.5	100.0

Discussion

General prevention of hypertension

In the face of the increasing incidence of modern-age diseases, including hypertension, which underlie the excessive mortality of modern societies, there is a growing need to implement effective prevention programmes [9].

In 2004 one in four (27.0%) 40-year-old Poles and almost one in two (46.5%) 50-year-old Poles were tested positive for high blood pressure, and generally high levels (above 200 mg%) of total cholesterol were noted in one in three people (38.4%) undergoing these tests [7]. With regard to the CSO data [7] that one in ten adult Poles has never had their blood pressure tested and only every second adult Pole has had their cholesterol level tested at least once in a lifetime, it appears to be advisable that people of working age should be obliged to perform periodic prevention examinations including lipid and glucose level tests as well as blood pressure measurement.

In our study, the vast majority of female respondents (75.6%) and more than half of male respondents (56.8%) stated that they care for their appropriate body weight. Given the fact that 80% of HTN cases in Poland are associated with increased body weight [9], it is undoubtedly a positive phenomenon. The study by Mastalerz-Migas *et al.* [10] confirmed this fact, although only partly because widespread overweight (26% F (female) and 70% M (male)) and obesity (5% female and 12% male) were observed in the study. The same study also showed a serious lack of awareness of this fact among respondents (40% male and 7% female) [10]. The results obtained in our study show that women see a doctor more often than men (67.3% female, 50.1% male) in order to perform preventive examinations, which is also indirectly confirmed by the studies of Mardarowicz *et al.* of 2008 [9] showing that the frequency of visiting a doctor for prophylactic examinations is smaller in the country (60% female and 54% male) than in the city (62% female and 55% male).

Taking into account the responses obtained in this study and the results of previous studies [6] it should be noted that the knowledge possessed by the respondents is not translated into practice. It does not significantly influence a change in health-related behaviours because patients are not motivated towards it [11]. Having even very extensive knowledge is not sufficient, in the absence of willingness and determination [10]. Therefore, it should be considered necessary to design and implement social campaigns which would facilitate improvement of the effectiveness of preventive measures, and increase awareness of the positive influence of prevention on health.

Prophylaxis to reduce substance use

WHO statistics showed that Poland has got one of the highest smoking prevalence rates in Europe [12] and in the world [13]. In the studies carried out in all European countries in 2002 in the age group 20 to 64, it was shown that in Poland 46% of men and 31% of women [14] smoke cigarettes. Our study provided similar results – 48.4% and 32.4% respectively. This puts Poland in the 6th place in Europe among men and in the 7th among women [14]. In comparison to, for example, the United Kingdom, where 25% of men and 23% of women [15] smoke cigarettes, and to the percentage of smokers in the general German (30%) and European (32%) [16] populations, current results on the prevalence of smoking in Poland are still high.

Alcohol consumption in Poland is, first and foremost, a problem of excessive drinking of spirits that are preferred over all other forms of alcohol, which was also confirmed by the results of our study. According to the CSO data (2007), 100% alcohol consumption per capita in Poland increased over the past 10 years by more than 2 l (from 7.02 l to 9.21 l) and the latest data indicate that the consumption amounts to 10.5 l of 100% alcohol per inhabitant per year [7]. More than half of alcohol in Poland is consumed by people within the age of 25 to 44 years, mainly men in the period of greatest professional activity [7]. In our study it was also men who most often crossed the pressor threshold. According to the data of the International Wine and Spirits, in 2006 Europeans drank 79 billion l of alcohol, i.e. 101.25 l per person. People in the U.S. in the same period consumed 98.7 l of liquors per capita, while in the countries of Asia and the Pacific region, this rate was only 22.1 l [17].

With regard to the frequency of alcohol consumption, the results of our study may be considered consistent with the results of a survey (2009) conducted in all EU countries on the group of respondents over 15 years of age [18], because the difference in the age of the respondents could lower a result in a Euro poll. That result indicates that 19% of Poles drink alcohol 2-3 times a week. Considering the fact that 23% of EU citizens use alcohol 2-3 times a week, 9% 4-5 times a week and as many as 14% of EU citizens admitted that they drink on a daily basis, whereas in Poland only 1% of people [18] drink every day (in our study 0.5% of women and 6.6% of men), the results obtained demonstrate that we are far below the EU average. On the whole, while considering the problem of alcohol consumption in Poland special attention should be paid not only to the structure of drinks consumed, but also to socially acceptable drinking patterns. They consist in a one-time excessive consumption that almost always leads to intoxication, which is also confirmed by our results. It is currently

estimated that nearly 3 million people exceed the limits of sobriety in Poland every day and 4-5 million people belong to the group of heavy drinkers [19]. In comparison, in Germany, according to the German Report of Drugs and Addiction [20], more than 9 million German adults (31% of males and 16% of females) consume inappropriate amounts of alcohol. The number of people who drink excessively, according to the findings of specialists, is proportional to the square of the increase of the average consumption. Assuming that an alcoholic usually starts a family of four, the problem of alcohol abuse in Poland may affect 20 million people.

Nutritional prevention

Similarly to our study, in the U.S. the consumers of healthy foods were mainly female, well educated, with a high income, aged 35 to 55 years [21]. Motives play a significant role in choosing health-promoting foods. According to the aforementioned study by Zunft and Friebe [22], 66% of respondents are guided by the prevention of diseases, while a Polish study by Czapska *et al.* [23] showed that 74% of respondents bought this kind of foods mainly because of health benefits. Health concerns are expressed in, among other things, reduced consumption of foods rich in fat and increased fruit and vegetable consumption [24], as can be seen in the results obtained in a group of women. In the study by Szczepaniak *et al.* [25] on national consumers' attitudes towards health-oriented foods it was found that products with lower fat and cholesterol content have greater importance in disease prevention than those which are low in sugar and salt. Against that background, our results indicate adverse health-related food behaviours of Poles. A similar result was obtained by Pawelec [26]. The result obtained does not make us significantly different from American society. This is because U.S. consumers admittedly prefer low-calorie products which are, however, not devoid of fat [27].

These findings allow us to conclude that the knowledge of the negative impact of cholesterol on the cardiovascular system and the significance of proper nutrition does not translate into the formation of healthy eating habits. However, a change in these nutrition-related behaviours is needed. While it is true that in recent years positive changes [28] in eating behaviours of Poles, such as increased consumption of vegetables and poultry and reduced consumption of red meat, have been noted, they are still too small to constitute health-promoting behaviours [29].

As far as salt intake is concerned, along with the progress of civilization salt in the diet is becoming more common. Sodium intakes around the world are well in excess of the physiological need (i.e.

10 mmol/day to 20 mmol/day). Most adult populations have mean sodium intakes > 100 mmol/day, and for many (particularly the Asian countries) mean intakes are > 200 mmol/day [30]. The INTERSALT study completed in 1989 [31] showed that Poland, with the average values of sodium excretion > 200 mmol/day for men at the time, was next to countries such as Canada, Colombia, Hungary, India, Italy, Portugal and South Korea. Over the past 20 years a number of awareness raising activities have been undertaken in Poland to inform the public about the need to reduce the amount of sodium in the diet, which, as can be observed, yielded positive results (1/3 of respondents declared that they limited the amount of salt in the diet, and half of the respondents indicated that they try not to over-use it). Still, taking into account the absolute values (currently NaCl intake in Poland amounts to ≈ 15 g/24 h, which exceeds three times the norm recommended by the European Society of Hypertension and the WHO set at 5 g/24 h), we are far from the level achieved in developed countries with the average daily intake of salt of 10 g/24 h [32], and in American and Western Samoa [33], Spain [34], Ghana [35] and Venezuela [36], where the level of the daily intake is < 100 mmol, equivalent to 6 g of NaCl.

Prophylaxis in the form of physical activity

A sedentary lifestyle constitutes one of the most important problems of the public health in developed countries. In many countries the percentage of people with too little physical activity reaches 60-70% of the adult population and at least 30-50% of children and adolescents [37]. Taking into account our results, it should be noted that Poland does not differ significantly in this respect from the above data. This is confirmed by the results of the CSO study conducted in 2008 (by the use of the *Questionnaire 183-6/58.2 Special Eurobarometer. Physical Activity, 2003*) comparing physical activity in Poland to the other EU countries. It shows that in Poland, 33.5% of the population reported a high level of physical activity. A higher percentage of people reported high levels of physical activity in Denmark (34.1%), Luxembourg (36.3%), Greece (37.0%) and Germany (40.2%). It should be emphasized that there was no statistically significant difference between the percentage in Poland and the European average (31.3%) [3, 7].

Pharmacological prophylaxis

Prophylactically, however, most Poles use various supplements (e.g. micronutrients, herbal preparations). Numerous studies indicate that consumption of dietary supplements is becoming increasingly

common [39]. National research conducted by the Institute of Food and Nutrition in households in 2000 demonstrated that 20% of people [40] used supplements. Research by Pietruszka and Brzozowska proves that this phenomenon is increasing in Poland, which is also confirmed by our findings [41]. Individual use of supplements in the societies of developed countries is also common [42]. The Federation of Consumers [43] reports that in some cases sales of OTC drugs increase after each airing of advertisements, which are regarded as a reliable source of information. This trend is common in many countries [44, 45].

Limitations

The study was conducted in 2009. However, given the fact that behavioural changes in society proceed very slowly, it may be assumed that the results obtained do not differ much from the respective behaviours of Poles in the present year.

Moreover, no anthropometric measurements of the respondents were taken; weight and height were only reported by the subjects. Diet analysis was not based on a food diary.

In conclusion, the study presented here allowed us to analyse health-promoting behaviours of Poles undertaken to prevent HTN development. It also enabled us to draw the following conclusions: firstly, Poles take various health-promoting actions aiming to prevent HTN such as attempting to maintain normal body weight, fighting chronic stress, and reducing the intake of table salt. Secondly, in a number of other areas such as the amount and kind of alcohol consumed, cigarette smoking, physical exercise and a well-balanced diet, these actions should be considered insufficient for effective HTN prevention. Thirdly, one of the kinds of preventive actions is pharmacotherapy, which is used by approximately 30% of respondents and the most frequently used pharmaceuticals comprise dietary minerals, herbal preparations and ω -3 supplements. Moreover, according to the respondents, non-pharmacological treatment is safer than pharmacological treatment, yet they also admit that the latter is more effective. Fourthly, in the group of social and demographic factors, sex is the factor that influences taking preventive actions the most. Women take prophylactic actions far more often than men.

In the face of the problems described above, it seems essential to undertake intense educational campaigns aiming to increase public awareness of the necessity and methods of preventing cardiovascular conditions, because effective HTN prophylaxis may not only improve the epidemiological situation, but also help reduce expenditure on treatment of this disease and its complications.

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