

Predictors of knowledge of blood pressure – a descriptive study

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Abstract. *Goal:* The goal of the study was to identify the number of individuals treated for hypertension, to verify the degree of their knowledge of their topical values of systolic and diastolic pressure, and to find out the dependence of regular BP measuring in the home setting on selected socio-demographic factors. *Methodology:* The quantitative study was performed using the method of standardized face-to-face interviews. The sample consisted of 1,004 respondents. The data were collected using a non-standardized questionnaire focused on stroke prevention and relating selected factors.

Results: The investigation identified more than 58% of patients treated for hypertension. More than 50% (n=559) of respondents knew their topical BP values. In 1/3 of them the BP values corresponded with hypertension, 29.2% (175) mentioned the systolic BP ≥ 140 mmHg, and 28.9% (173) mentioned BP ≥ 90 mmHg. 260 respondents (25.9%) regularly measure their BP in the home setting. The topical knowledge of BP and regular BP measuring depended on the age, marital status, occupation and education ($p < 0.001$). Individuals regularly visiting their GPs knew the BP values better and performed regular BP measuring in the home setting more frequently.

Conclusion: More than 50% of respondents knew their BP values at the time of the study. According to the announced BP values, 1/3 of the sample reached the hypertension values of ($\geq 140/90$ mmHg). The knowledge of BP and regular BP measuring depended on the age, marital status, occupation and education, and regular visits to general practitioners. Fig. 1, Tab. 6, Ref. 15, on-line full text (Free, PDF) www.cardiologyletters.sk

Key words: blood pressure – hypertension – risk factor – stroke

The INTERSTROKE study contributed to the identification of influenceable risk factors of stroke across the world and populations (1). The history of hypertension or repeatedly measured high blood pressure (TK $\geq 140/90$ mm) were determined as the most important modifiable risk factor (odds ratio of 2.98, 99% CI 2.72–3.28; Attributable Risk 47.9%, 99% CI 45.1–50.6). The other risk factors (RF) were identified in the following order: physical activity (exercise) (35.8%), apolipoproteins ratio of B/A1 (26.8%), nutrition (23.2%),

waist to hips ratio (186 %), psychosocial factors (174%), current smoking (124%), cardiac causes (91%), alcohol consumption (5.8%) and diabetes mellitus (3.9%). The results of the INTERSTROKE study contributed to the worldwide generalization of approaches to the stroke prevention.

According to the European Society of Hypertension, hypertension is defined as $140 \geq$ mmHg of systolic pressure and $90 \geq$ mmHg of diastolic pressure (2). Hypertension is responsible for most of the burden caused by

mortality (up to 40% – Results from the Global Burden of Disease, Injuries, and Risk Factor study 2015 (GBD 2015), and disability related risk factors to 41% of all disability-adjusted life-years (DALYs) in 2015, in spite to the fact that progress in hypertension diagnostics and treatment has been achieved in the last years (3), and is named as the main stroke risk factor (4). In the Czech Republic about 40% of population suffer from hypertension (5). The study called Czech post – Monica shows that at the age of 55–64 years, 57.4% women and 72.1% men suffer from hypertension (5). The incidence of hypertension increases with age. More than two thirds of persons older than 65 years suffer from hypertension. It is estimated that 45% of strokes are caused by uncontrolled hypertension (6).

The complex hypertension treatment includes medication and the modification of lifestyle. The modification of lifestyle appears to be an effective approach to the decrease of the stroke risk in the case of the threshold values of hypertension (140/90 mmHg) and high normal pressure (130–139/85–89 mmHg). The problem in the hypertension treatment is the adherence (7). In 1972, Wilber and Barrow described the “rule of halves” saying that one half of patients have been detected, one half of them have been treated while one half of them have reached the target values of blood pressure (8). In spite of the increasingly improving treatment, the detection, treatment and control of blood pressure remain subnormal across the world (9, 10). In general practice there is still space for effective patient education on hypertension. Nurses can play an important role in the education on non-pharmacological approaches to hypertension treatment. Nurses can hold motivation dialogues with treated hypertonic patients on the importance of smoking cessation, nutrition adjustment and the importance of exercise (11).

The goal of the study was to identify the number of individuals treated for hypertension, to verify the degree of their knowledge of topical values of systolic and diastolic pressure, and to find out the dependence of regular BP measuring in the home setting on selected socio-demographic factors.

Material and Methodology

In the first phase of the grant project, a quantitative sociological study was performed aiming at the health literacy and influenceable stroke risk factors in a representative sample of the population. In the pilot study used for verifying the tools and wording of individual questions, a selected sample of 112 respondents was

tested in September, 2019. The actual field study was performed in November and December, 2019.

The field study used the method of standardized face-to-face interviews. The final version of the questionnaire was based on the results of the pilot study. The study was anonymous, the participation was voluntary, and the actual investigation contained no controversial ethical questions. The sample consisted of 1,004 respondents. The data were collected using a non-standardized questionnaire focused on influenceable risk factors (RF) of stroke. Besides socio-demographic data (sex, age, address, marital status, occupation and education), the respondents were asked to answer whether they had been treated for one of the selected diseases and whether they had been currently suffering from a disease longer than 6 months, whether they knew their BP value (they were asked to mention this value), whether they saw their general practitioners for preventive examinations (1/year), and whether they regularly measured blood pressure in their home setting.

Sample

The sample of respondents was constructed using a quota selection so that the structure may correspond with the composition of all CR citizens from the point of view of regions, sex and age. These features were determined as representative. The quota selection was performed using the representative features. 1,137 selected citizens were asked for the interview on the population's health literacy and healthy lifestyle. The interview was refused by 133 respondents (11.7% of all addressed persons).

As a result, the sampled consisted of 1,004 respondents, 489 (48.7%) women and 515 (51.3%) men, which corresponds with the analogic composition of the CR citizens aged 18+ (**Table 1**). In comparison with the relative frequencies, the deviation of the selected sample from the basic sample was 0.1% in the case of sex.

Data Processing

Statistic data were processed using SASD 1. 4. 12 (Statistical Analysis of Social Data) and SPSS software. The classification degree 1 and contingency tables of the classification degree 2 were processed. The testing of the distribution of variables (Tests of Normality) were performed using Kolmogorov-Smirnov and Shapiro-Wilk tests. According to this distribution and character of the signs, the parametric and non-parametric tests (Chi-Square Tests, Mann-Whitney Test, Kruskal-Wallis Test) were used for the significance calculations.

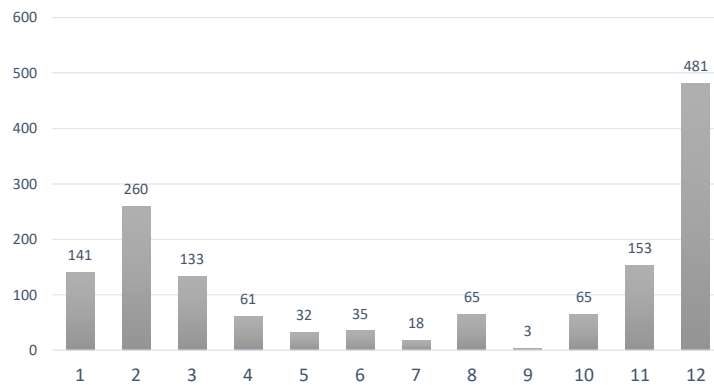


Figure 1 Disease treatment

1) diabetes; 2) high blood pressure; 3) high cholesterol; 4) arrhythmia; 5) hyperlipidemia; 6) coagulation disorders; 7) sleep apnea syndrome; 8) migraines; 9) drug addiction; 10) sleeping disorders; 11) other diseases; 12) not treated for any of the mentioned diseases.

Note – The sum of the relative frequencies is higher than 100% as the respondents had the possibility to name more diseases

Results

1,137 selected citizens were addressed, and the interview was refused by 133 respondents (11.7% of all addressed persons). As a result, the sample consisted of 1,004 respondents (**Table 1**), 48.7% (489) men and 51.3% (515) women.

49.9% (501) respondents were not treated for a disease lasting more than 6 months, 5.7% (57) answered I don't know, and the remaining 44.4% (446) had been treated for one or more diseases. Statistical analysis showed that the incidence of long-term diseases had been influenced by age (< 0.001), marital status (< 0.001), occupation (< 0.001) and education (< 0.001). Treatment for a long-term disease (6 and more months) was mentioned by 41.7% men and 46.9% women. The statistical analysis proved that long-term disease had occurred in respondents aged 65 and more years (76.5%). Furthermore, long-term disease occurred in widowed respondents (80.2%). Logically, long-term disease was mentioned by disability pensioners (80.7%). Education could have an influence on the frequency of a long-term disease. Respondents with a basic education (65.8%) gave a positive answer more frequently (**Table 2**). 260 out of the 446 persons who had mentioned the treatment for a long-term disease answered that they had been treated for high blood pressure, 141 respondents were treated for diabetes. 133 respondents were treated for a high cholesterol level at the time of the study. Almost 1/2 (47.9 %) of respondents were not treated for any disease (**Figure 1**).

599 (59.7%) respondents, 257 (52.6%) men and 342 (66.4%) women, answered that they knew their BP values. 65.2% of married and 66.7% widowed respondents knew their BP values. The BP values were known to old-age

Table 1 Sample composition (n=1004)

Sex	Absolute frequency	%
Man	489	48.7
Woman	515	51.3
Age		
18-24	80	8
24-34	161	16
35-44	199	19.8
45-54	171	17
55-64	151	15
65 and more	242	21.4
Address		
Town/city	650	64.7
Country	354	35.3
Marital status		
Single	158	15.7
Partner (common-law marriage)	169	16.8
Married	492	49
Divorced	105	10.5
Widowed	96	9.6
Occupation		
Full-time	486	48.4
Part-time	74	7.4
Businessman. self-employed	90	9
Disability pensioner	31	3.1
Old-age pensioner	247	24.6
Other occupations	76	7.6
Education		
Basic	38	3.8
Apprenticed	299	29.8
Secondary + school-leaving exam	401	39.9
Higher professional education	68	6.8
Academic	198	19.7

pensioners (70%; <0.001), which corresponds with the age category where, obviously, the respondents above 60 knew their BP values most frequently (67.8%; <0.001). Education could have an influence on knowledge of the BP value. The correlation to education shows that the respondents with a basic education (63.2%; <0.001) had the best knowledge, followed by respondents with secondary (62.3%) and academic education (61.1%; <0.001) (**Table 3**).

Respondents who knew their blood pressure (n=599) were asked to write down their values. Optimal systolic blood pressure (up to 119 mmHg) was mentioned by 21.7% respondents, normal BP (120–129 mmHg) by 21.5% respondents. A further 27.5% had high normal blood pressure (130–139 mmHg), the remaining 29.2% respondents had hypertension (140 and more mmHg).

Optimal diastolic blood pressure (do 79 mmHg) was mentioned by 31.7% respondents, normal blood pressure (80–84 mmHg) by 27.4% respondents. A further 12.0% of respondents mentioned high normal blood pressure (85–89 mmHg), and the remaining 28.9% respondents had hypertension (90 and more mmHg) (**Table 4**).

25.9% (260) of the 1,004 addressed respondents regularly measured their BP in their home setting. The remaining 74.1% answered that they did not measure blood pressure in their home setting. The statistical analysis proved the correlations between regular BP measurements and age (<0.001), marital status (<0.001) and occupation (<0.001). The results of the analysis (**Table 5**) show that the regularity of BP measurements increases with age. Respondents aged 65 years and

Table 2 Long-term disease (6 and more months) and selected socio-economic indicators (n=1004)

Sex	Yes	%	No	%	Don't know	%	X ²	df	p
Man	204	41.7	251	51.3	34	7	5.280	3	0.152
Woman	242	46.9	250	48.5	23	4.5			
Age									
18-24	15	18.7	62	77.5	3	3.8	249.542	15	<0.001
25-34	28	17.4	124	77	9	5.9			
35-44	60	30.1	122	61.3	17	8.5			
45-54	69	40.3	90	52.6	12	7			
55-64	89	58.9	55	36.4	7	4.6			
65 and more	185	76.5	48	19.8	9	3.7			
Address									
Town/city	288	44.3	324	49.8	38	5.8	0.348	3	0.951
Country	158	44.6	177	50	19	5.4			
Marital status									
Single	36	22.8	133	71.5	9	5.7	162.918	12	<0.001
Partner	46	27.2	112	66.3	11	6.5			
Married	246	50	224	45.5	22	4.5			
Divorced	51	48.6	43	41	11	10.5			
Widowed	77	80.2	14	14.6	5	5.2			
Occupation									
Full-time	151	31	301	61.9	34	7	251.205	15	<0.001
Part-time	29	39.2	41	55.4	4	5.4			
Self-employed	35	38.9	49	54.4	6	6.7			
disability pensioner	25	80.7	6	19.4	0	0			
old-age pensioner	189	76.5	48	19.4	10	4			
Others	17	22.4	56	73.7	3	3.9			
Education									
Basic	25	65.8	9	23.7	4	10.5	49.450	12	<0.001
apprenticed	164	54.9	115	38.5	20	6.7			
secondary + school-leaving	163	40.6	221	55.1	17	4.2			
higher professional education	20	29.4	42	61.8	6	8.8			
academic	74	37.3	114	57.6	10	5.1			

X² – square; p – independence test; df – degrees of freedom

Table 3 Knowledge of the BP value

Sex	Yes	%	No	%	X ²	df	p
Man	257	52.6	232	47.4	5.28	3	0.152
Woman	342	66.4	173	33.6			
Age							
18-24	45	56.2	35	43.8	249.542	15	<0.001
25-34	77	47.8	84	52.2			
35-44	112	56.3	87	43.7			
45-54	103	60.2	68	39.8			
55-64	98	64.9	53	35.1			
65 and more	164	67.8	78	32.2			
Address							
Town/city	389	59.8	261	40.2	0.348	3	0.951
Country	210	59.3	144	40.7			
Marital status							
Single	78	49.4	80	50.6	162.918	12	<0.001
Partner	82	48.5	87	51.5			
Married	321	65.2	171	34.8			
Divorced	61	58.1	44	41.9			
Widowed	64	66.7	32	33.3			
Occupation							
Full-time	275	56.6	211	43.4	251.205	12	<0.001
Part-time	42	56.8	32	43.2			
Self-employed	50	55.6	40	44.4			
Disability pensioner	16	51.6	15	48.4			
Old-age pensioner	173	70	74	30			
Others	43	56.6	33	43.4			
Education							
Basic	24	63.2	14	36.8	49.45	12	<0.001
Apprenticed	167	55.9	132	44.1			
Secondary + school-leaving exam	250	62.3	151	37.7			
Higher professional education	37	54.4	31	45.6			
Academic	121	61.1	77	38.9			

X² – square; p – independence test; df – degrees of freedom

older (42.1%), further widowed individuals (44.8%), and disability pensioners (64.5%) take their BP most frequently (Table 5).

This study detected the correlations between regular periodic examinations (every two years in adult population) and the knowledge of BP (p<0.001)

Table 4 Systolic and diastolic BP values (n = 599)

Systolic BP			Diastolic BP		
	Number	%		Number	%
Optimal sBP < 120 mmHg	130	21.7	Optimal dBP < 80 mmHg	190	31.7
Normal sBP 120-129 mmHg	129	21.5	Normal dBP 80-84 mmHg	164	27.4
High normal sBP 130-139 mmHg	165	27.5	High normal dBP 85-89 mmHg	72	12
Hypertension >140 and more mmHg	175	29.2	Hypertension >90 and more mmHg	173	28.9

Table 5 Regular BP measurements in the home setting

Sex	Yes	%	No	%	X ²	df	p
Man	118	24.1	371	75.9	1.548	1	0.217
Woman	142	27.6	373	72.4			
Age							
18-24	8	10	72	90	77.531	5	<0.001
25-34	21	13	140	87			
35-44	35	17.6	164	82.4			
45-54	37	21.6	134	78.4			
55-64	57	37.7	94	62.3			
65 and more	102	42.1	140	57.9			
Address							
Town/city	165	25.4	485	74.6	0.252	1	0.619
Country	95	26.8	259	73.2			
Marital status							
Single	19	12	139	88	55.599	4	<0.001
Partner	26	15.4	143	84.6			
Married	154	31.3	338	68.7			
Divorced	18	17.1	87	82.9			
Widowed	43	44.8	53	55.2			
Occupation							
Full-time	86	17.7	400	82.3	81.220	5	<0.001
Part-time	18	24.3	56	75.7			
Self-employed	24	26.7	66	73.3			
Disability pensioner	20	64.5	11	35.5			
Old-age pensioner	103	41.7	144	58.3			
Others	9	11.8	67	88.2			
Education							
Basic	12	31.6	26	68.4	8.335	4	0.080
Apprenticed	83	27.8	216	72.2			
Secondary + school-leaving exam	104	25.9	297	74.1			
Higher professional	8	11.8	60	88.2			
Academic	53	26.8	145	73.2			

X² – square; p – independence test; df – degrees of freedom

and BP measurements in the home setting ($p < 0.001$) (Table 6).

Discussion

Hypertension represents the main risk factor of ischemic and hemorrhagic stroke (brain ischemia and

intracerebral hemorrhage). In the European union (EU), stroke is the second most frequent cause of death and the main cause of disability in adults (12). The stroke incidence tends to decrease across the population. This trend is caused by the improved treatment of hypertension and other risk factors of cardiovascular diseases. Next to early treatment, a more effective organization of stroke patient care, such as the introduction of stroke units or the improvement of pharmacological and intervention approaches, plays an important role in the decreased incidence (13). The demographic phenomena, mainly prolonged life expectancy, will probably have a negative impact in the form of long-term consequences and increasing cost of stroke aftercare (14). Therefore, sufficient attention needs to be paid to hypertension prevention in the population.

In the Czech Republic, ca. 40% of population suffer from hypertension. The incidence of hypertension increases with the age, and in all age categories it is significantly higher in men. The Czech post-MONICA study shows that between 55-64 years of age, the prevalence is 57.4% in women and 72.1% in men (5). In our sample, 260 respondents were treated for high blood pressure at the time of the investigation. Almost one half of the respondents were not treated for any disease at the time of the investigation. In association with the treatment of selected risk factors, it was investigated whether the public take part in regular examinations by their general practitioners. According to Bártlová et al. (2021), more than 80% of the population visit their doctors regularly, the participation in these examinations is influenced by the sex, age, marital status and occupation of respondents (15).

In this association it was supposed that the respondents would know their BP values. The results show that more than half of the respondents were able to state their BP values. This knowledge was associated with age ($p < 0.001$), marital status ($p < 0.001$), occupation ($p < 0.001$) and education ($p < 0.001$). Obviously, the BP values were better known to older respondents, widowed respondents, followed by married respondents, and old-age pensioners. Interestingly, respondents taking part in regular preventive examinations knew their BP values more frequently (536 from 599 respondents).

Table 6 Correlations between regular periodic examinations and the knowledge of BP and BP measurements in the home setting

Regular examinations	Yes	%	No	%	X ²	df	p
Knowledge of the BP value (n= 599)	536	64.3	63	37.1	43.443	1	<0.001
Regular BP measurements (n=260)	237	28.4	23	13.5	16.311	1	<0.001

X² – square; p – independence test; df – degrees of freedom

Further results show that 1/3 of respondents gave values of systolic and diastolic BP equaling hypertension. However, it needs to be emphasized that these values were mentioned by respondents, not measured as a part of the study.

The topics of treatment and knowledge of BP values are associated with the question whether BP is regularly measured in the home setting. One third of respondents regularly measure their BP in the home setting. A semi-automated arm tonometer needs to be used for home BP monitoring. The monitoring includes taking BP for 3 days at a stretch (ideally 6 – 7 days). BP is measured in a quiet setting after 5 minutes of rest, in the morning and in the evening. The actual BP monitoring can have a positive influence of the medication and BP control (2). The statistical analysis proved the correlation between regular BP measurements and age (<0.001), marital status (<0.001) and occupation (<0.001). The results of the analysis show that the regularity of BP measurements increases with age. The respondents 65+, widowed respondents and disability pensioners take their BP more frequently. Even in this case, the importance of regular preventive examinations is evident. Respondents who take part in regular preventive examinations answered more frequently that they regularly take their BP at home.

The results show that respondents who take part in regular preventive examinations know their BP values better and regularly take their BP.

Limitations of the Study

The values of systolic and diastolic blood pressure were not investigated objectively. The represented data were filled in the sheet by respondents.

Conclusion

The results show a high incidence of patients treated for hypertension (466 patients treated for a disease include 260 patients with hypertension). At the time of the investigation, more than 1/2 of respondents knew their BP values. According to the announced values, 1/3 of the sample reached the values of hypertension ($\geq 140/90$ mmHg). At the time of the investigation, more than 1/4 of the respondents took their blood pressure at home. Other results show that the knowledge of BP values and regular home measuring correlate with selected socio-economic factors, such as the age, education and occupation. Interestingly, respondents visiting regularly their preventive examinations knew better their BP values and took BP in the home setting more frequently.

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