



# HYPERTENSION IN COMMON POPULATION AND ITS ASSOCIATION WITH OTHER RISK FACTORS OF ATHEROSCLEROSIS

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## INTRODUCTION AND OBJECTIVE

The leading causes of death in the developed countries are atherosclerotic diseases of the circulatory system. The cardiovascular survival depends on the blood pressure and other risk factors of atherosclerosis (RFA). Hypertension (HT) as one of the important RFA is often associated with other RFA. The main objective of the paper is to demonstrate prevalence of HT and other RFA in the two urban Czech populations.

## DESIGN AND METHODS

We offered a preventive examination regarding the risk of the development of atherosclerotic diseases to the resident population in the capital Prague (Praha) and in a small town in Eastern Bohemia (Čáslav). Total of 974 persons was examined in both outpatient clinics of EuroMISE Centre (in Prague and in Čáslav). There were 415 men (42.61 %, mean age 47.78 years) and 559 women (57.39 %, mean age 49.35 years) - see Figure 1. The basic characteristics of men and of women are given in the Table 1 and Table 2.

The hypertension was defined as BP  $\geq 140$  and/or  $\geq 90$  mm Hg ( $\geq 130$  and/or  $\geq 85$  mm Hg in patients with diabetes mellitus and/or glycaemia level  $> 6$  mmol/l) or history of hypertension regardless of BP actual value. According to this definition, there were 393 hypertensive persons (40.4 %) in all the population. See Figure 2 and Table 3 for details.

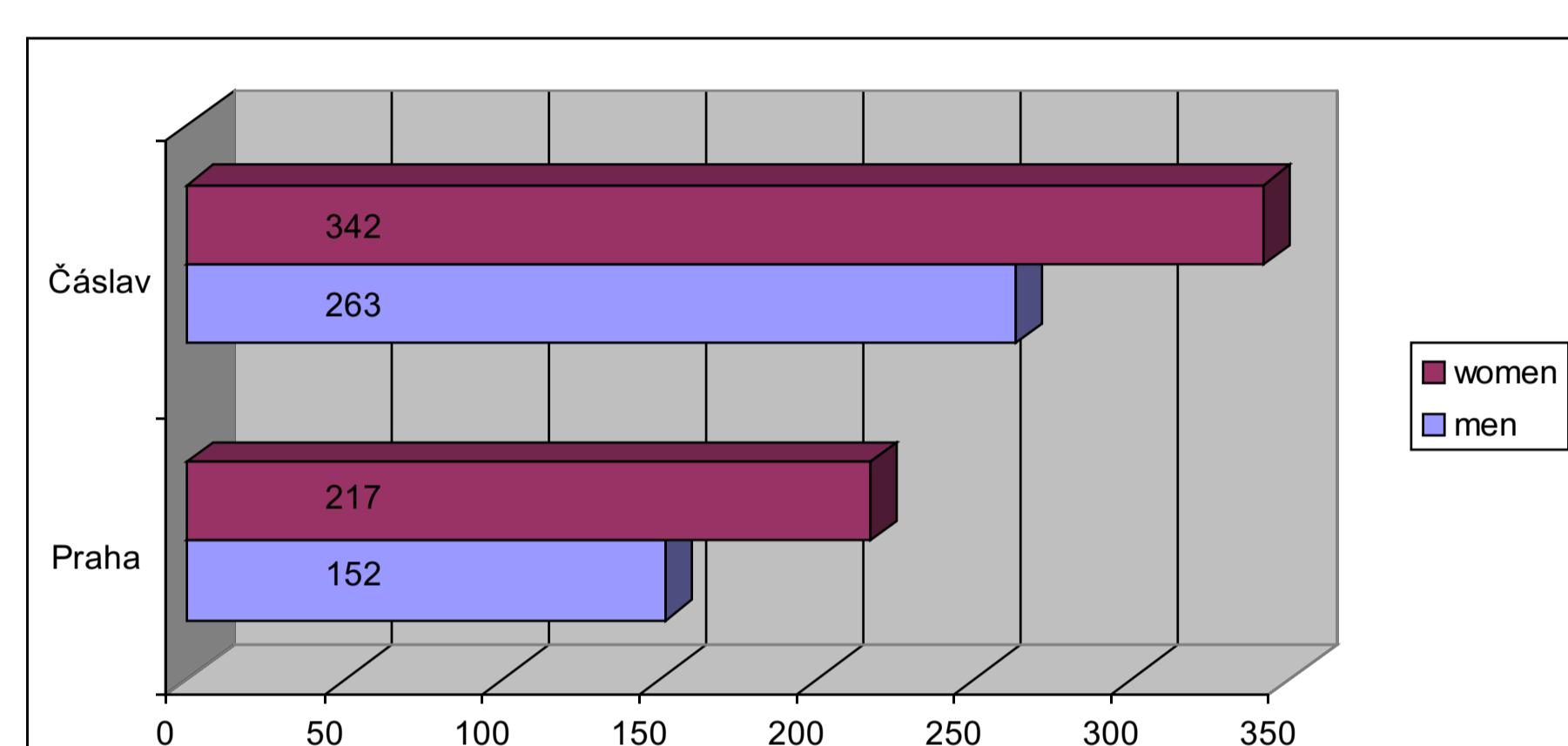


Figure 1: Study population

	Praha		Čáslav		
	Mean	SD	Mean	SD	p value
Age (years)	52.82	11.57	47.19	11.14	< 0.001
Height (cm)	163.23	5.95	163.02	6.17	0.69
Weight (kg)	69.47	11.95	73.42	17.48	< 0.001
Waist (cm)	82.86	11.98	81.95	14.11	0.45
Hip (cm)	101.44	9.82	99.32	12.24	0.04
BMI	26.10	4.48	27.44	6.04	0.01
WHR	0.81	0.08	0.82	0.07	0.29
BP syst. (mm Hg)	133.93	24.71	131.66	21.46	0.28
BP diastol. (mm Hg)	84.34	11.42	82.52	11.20	0.08
Glykemia (mmol/l)	4.91	0.79	4.96	0.84	0.58
Uric acid (umol/l)	264.54	64.81	224.96	66.29	< 0.001
Total cholesterol (mmol/l)	5.66	1.06	5.78	1.26	0.37
HDL cholesterol (mmol/l)	1.70	0.31	1.73	0.47	0.51
LDL cholesterol (mmol/l)	3.39	0.92	3.43	1.05	0.75
Triglycerids (mmol/l)	1.37	0.68	1.43	0.84	0.53

Table 1: Women - basic characteristics

	Praha		Čáslav		
	Mean	SD	Mean	SD	p value
Age	49.29	13.92	46.99	10.34	0.06
Height	177.27	7.05	175.96	6.25	0.06
Weight	83.77	14.30	88.18	15.23	0.01
Waist	92.78	11.67	93.50	10.41	0.53
Hip	100.44	7.49	98.44	6.45	0.01
BMI	26.62	4.03	28.22	3.91	< 0.001
WHR	0.92	0.07	0.95	0.07	< 0.001
BP syst.	134.25	15.21	138.56	17.39	0.02
BP diastol.	85.60	9.65	87.89	10.84	0.05
Glykemia (mmol/l)	5.09	0.75	5.17	1.41	0.64
Uric acid (umol/l)	343.47	71.85	308.71	74.08	< 0.001
Total cholesterol (mmol/l)	5.35	0.90	5.90	1.17	< 0.001
HDL cholesterol (mmol/l)	1.49	0.35	1.44	0.41	0.29
LDL cholesterol (mmol/l)	3.14	0.66	3.60	1.00	< 0.001
Triglycerids (mmol/l)	1.74	1.64	1.96	1.29	0.23

Table 2: Men - basic characteristics

	W: HT +	W: HT -	M: HT +	M: HT -
Systolic BP (mm Hg)	151.70	119.80	147.10	125.50
Diastolic BP (mm Hg)	91.96	78.39	93.20	81.62

Table 3: Mean values of blood pressure

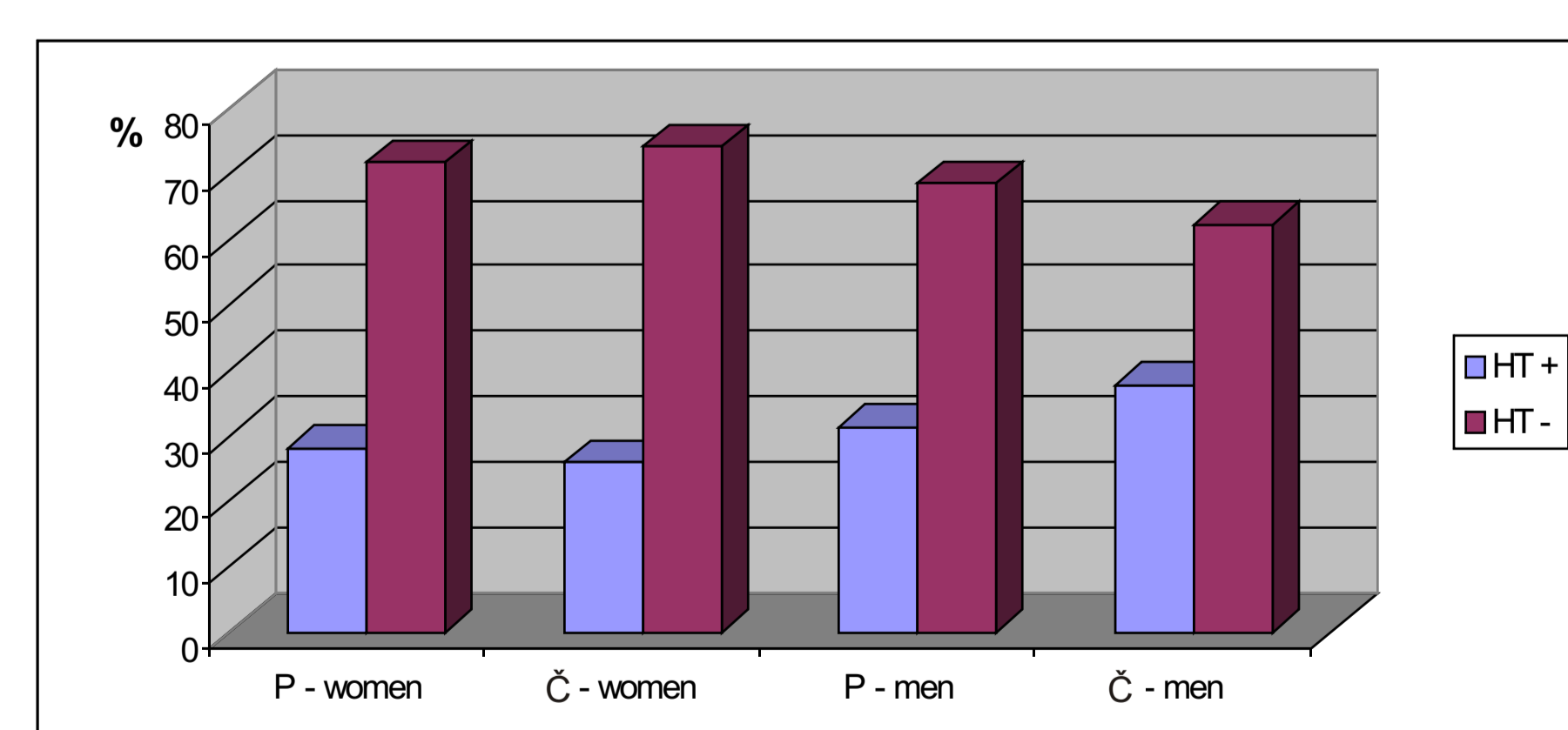


Figure 2: Hypertension in the study population

## STATISTICAL ANALYSIS

The statistical programme R, version 2.1.0 was used. The comparison of the groups of both towns was done by two-sided test (t-test or Wilcoxon test). Mean and standard deviation are shown in the tables. The value of  $p < 0,05$  means statistical significance at the 5% level.

## RESULTS

There were some significant differences between hypertensive and non-hypertensive persons of both genders in anthropometric (age, BMI, waist and hip circumference and WHR) and basic laboratory variables. Hypertensive persons were older, had higher BMI, waist and hip circumference and WHR. Hypertensive women in Čáslav compared to normotensive women had a very high level of total and LDL cholesterol and lower level of HDL cholesterol. In Prague, there was the difference in HDL cholesterol only. Risk profile in people from Čáslav was worse than in people from Prague. See Tables 4-7.

	HT +		HT -		
	Mean	SD	Mean	SD	p value
Age (years)	56.65	9.79	49.72	11.1	< 0.001
Waist (cm)	90.86	11.51	78.32	9.57	< 0.001
Hip (cm)	106.58	9.65	98.57	8.67	< 0.001
BMI	28.43	4.39	24.74	3.95	< 0.001
WHR	0.85	0.09	0.79	0.06	< 0.001
BP syst. (mm Hg)	155.17	22.53	119.54	11.16	
BP diastol. (mm Hg)	93.78	9.47	79.13	7.18	
Heart rate (beats per minute)	72.76	12.76	70.76	10.81	0.253
Total cholesterol (mmol/l)	5.59	0.85	5.69	1.17	0.627
HDL cholesterol (mmol/l)	1.62	0.31	1.74	0.3	0.046
LDL cholesterol (mmol/l)	3.38	0.76	3.4	1.01	0.919
Triglycerid (mmol/l)	1.45	0.77	1.33	0.62	0.368
Uric acid (umol/l)	292.56	75.22	244.3	47.31	< 0.001
Glycaemia (mmol/l)	5.03	0.77	4.83	0.79	0.209

Table 4: Prague - women - difference between hypertensive (HT+) and non-hypertensive (HT-) people

	HT +		HT -		
	Mean	SD	Mean	SD	p value
Age (years)	53.81	9.73	43.34	10.07	< 0.001
Waist (cm)	89.92	14.42	77.21	11.59	< 0.001
Hip (cm)	105.42	13.42	95.69	9.87	< 0.001
BMI	30.73	6.55	25.42	4.7	< 0.001
WHR	0.87	0.07	0.8	0.06	< 0.001
BP syst. (mm Hg)	149.52	19.75	120.05	12.15	
BP diastol. (mm Hg)	90.83	9.73	77.32	8.36	
Heart rate (beats per minute)	76.21	11.59	73.18	11.96	0.023
Total cholesterol (mmol/l)	6.22	1.52	5.53	1.03	< 0.001
HDL cholesterol (mmol/l)	1.6	0.48	1.8	0.45	< 0.001
LDL cholesterol (mmol/l)	3.86	1.06	3.19	0.97	< 0.001
Triglycerid (mmol/l)	1.65	0.96	1.3	0.8	0.001
Uric acid (umol/l)	253.02	82.15	212.98	54.45	< 0.001
Glycaemia (mmol/l)	5.31	1.07	4.77	0.6	< 0.001

Table 5: Čáslav - women - difference between hypertensive (HT+) and non-hypertensive (HT-) people

	HT +		HT -		
	Mean	SD	Mean	SD	p value
Age (years)	51.69	14.25	47.59	13.51	0.074
Waist (cm)	95.2	12.53	90.88	10.64	0.030
Hip (cm)	101.57	8.39	99.56	6.63	0.115
BMI	27.84	4.17	25.68	3.67	0.001
WHR	0.94	0.08	0.91	0.06	0.055
BP syst. (mm Hg)	143.38	14.66	123.63	7.95	
BP diastol. (mm Hg)	90.95	8.98	81.64	6.26	
Heart rate (beats per minute)	69.95	12.71	69.47	11.32	0.814
Total cholesterol (mmol/l)	5.23	0.99	5.48	0.79	0.243
HDL cholesterol (mmol/l)	1.39	0.34	1.61	0.33	0.009
LDL cholesterol (mmol/l)	3.07	0.6	3.21	0.71	0.397
Triglycerid (mmol/l)	2.01	2.18	1.43	0.61	0.142
Uric acid (umol/l)	351.27	76.89	335.67	66.82	0.406
Glycaemia (mmol/l)	5.21	0.74	4.96	0.76	0.154

Table 6: Prague - men - difference between hypertensive (HT+) and non-hypertensive (HT-) people

	HT +		HT -		
	Mean	SD	Mean	SD	p value
Age (years)	49.78	9.93	44.42	10.08	< 0.001
Waist (cm)	97.72	10.37	89.48	8.76	< 0.001
Hip (cm)	100.44	6.44	96.52	5.87	< 0.001
BMI	29.76	4.21	26.78	2.97	< 0.001
WHR	0.97	0.06	0.93	0.06	< 0.001
BP syst. (mm Hg)	149.01	18.6	126.64	9.49	
BP diastol. (mm Hg)	94.33	9.74	81.61	6.88	
Heart rate (beats per minute)	71.17	14.92	69.21	10.58	0.225
Total cholesterol (mmol/l)	5.92	1.14	5.87	1.19	0.734
HDL cholesterol (mmol/l)	1.45	0.41	1.43	0.42	0.711
LDL cholesterol (mmol/l)	3.55	1.04	3.65	0.97	0.430
Triglycerid (mmol/l)	2.13	1.37	1.81	1.19	0.058
Uric acid (umol/l)	322.15	79.49	293.16	64.59	0.040
Glycaemia (mmol/l)	5.51	1.79	4.86	0.83	0.001

Table 7: Čáslav - men - difference between hypertensive (HT+) and non-hypertensive (HT-) people

We found some differences in socio-economic factors (education) - see Table 8 and in lifestyle (physical activity and smoking) - see Table 9-10.

	P: HT +	P: HT -	Č: HT +	Č: HT -
Basic (%)	18.52	22.89	60.83	51.06
Secondary (%)	58.72	55.45	42.17	56.81
University (%)	35.07	40.10	12.85	12.75

	P: HT +	P: HT -	Č: HT +	Č: HT -
None (%)	18.52	22.89	60.83	51.06
Mild (%)	47.41	43.78	27.08	37.76
Moderate and high (%)	34.07	33.33	12.08	11.18

Table 8: Education

Table 9: Physical activity at leisure time

	P: HT +	P: HT -	Č: HT +	Č: HT -
Ex-smoker (%)	24.06	13.17	12.50	5.25
Smoker (%)	15.04	17.07	16.94	31.20
Non-smoker (%)	60.90	69.76	70.56	63.56

Table 10: Smoking status

In Prague, there was no significant difference in education between hypertensive and in non-hypertensive people ( $p = 0.29$ ). In Čáslav, there was a significant difference ( $p < 0,001$ ) - see proportions of people with basic and secondary education in Table 8.

In Prague, there were no differences between groups according to the physical activity at leisure time. In Čáslav, more than half of people was without any physical activity at leisure time. Moreover there were significant differences in physical activity between hypertensive and non-hypertensive people ( $p = 0.026$  - see Table 9).

The results of analysis of smoking status were surprising. There were significant differences in both populations ( $p < 0.001$  in Čáslav and  $p = 0.036$  in Prague). In Prague, more ex-smokers were in the hypertensive group than in the non-hypertensive group (24 % and 13 %, respectively). In Čáslav, the frequency of smokers was smaller in the hypertensive group than in the non-hypertensive one (17 % and 31 %, respectively).

## CONCLUSIONS

The situation in the prevention of atherosclerotic diseases is not satisfactory in the Czech Republic and all over the world. We confirmed the very unfavourable atherosclerotic risk profile in the healthy middle-aged Czech population. In accordance with great epidemiological studies, women are more interested in the preventive examination and in the preventive measures.

In the examined urban populations a very high prevalence of HT and other RFA was found out. A more intensive detection and more intensive treatment of these factors starting with lifestyle changes are necessary in the Czech population.

## Contact

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