

ORIGINAL PAPER

The Frequency of Hypertension Crises in the Emergency Medical Service Department in Tuzla

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Objectives: The aim of this study was to evaluate a frequency and clinical presentation of hypertension crises due to age, gender, duration and seriousness at Emergency Medical Service Department of the “Dr Mustafa Šehovic” Health Care Center Tuzla. **Methods:** The research was conducted in the period between November 2009 and April 2010 and involved 180 examinees of both genders, aging between 30 and 80 years of age with the diagnosis of arterial hypertension. The examinees were divided into two groups: control group consisting of examinees without hypertension crisis (95 examinees) and experimental group consisting of examinees with hypertensive crisis (85 examinees). Descriptive statistical methods were used in the statistical data processing. **Results:** The research results showed that there had been significantly more female examinees than the male ones (60% vs. 40%; $p=0.007$). The average age of male examinees was 55.83 ± 11.06 years of age, and the average age of female examinees was 59.41 ± 11.97 years of age. The hypertension crisis frequency was 47.22%, where the hypertensive urgencies were statistically significantly more present than the hypertensive emergencies (16.47% vs. 83.53%; $p < 0.0001$). The largest number of experimental group examinees (28.23%) belonged to the age group of 60 to 69 years of age; urgency 26.76% and emergency 35.71%. The largest number of examinees with hypertensive crisis (49.41%) appeared in the period between 6.00 p.m. and 11.59 p.m. The largest number of emergency group examinees (69.01%) had been treated for arterial hypertension for ten years, and the examinees from the emergency group (42.86%) had been treated for 10, 11 and 20 years. The average blood pressure value at the hypertensive crisis examinees was 204.82/126.58 mmHg. **Conclusions:** The frequency of hypertensive crises in the Emergency Medical Service Department is high and it reaches 47.22%. Hypertensive urgencies were significantly more present in terms of statistics than the hypertensive emergencies (83.53% vs. 16.47%; $p < 0.0001$). **Key words:** hypertensive crisis, emergency, urgency.

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1. INTRODUCTION

Arterial hypertension is the main independent risk factor in cardiovascular diseases and death rate occurrence in developed, but also in developing countries where our country belongs to. About 50% of all heart attack

cases and about 60% cerebrovascular accidents are the consequence of higher blood pressure. The aim of treatment of patients with hypertensive crisis is to stop damage of target organs (1). Based on the specimen, the hypertension can be primary (essential) and secondary.

Primary, idiopathic hypertension has no known cause and it is present in 95%-99% adult hypertensive patients. Secondary hypertension makes 1%-5% of all hypertension cases. The most common conditions leading to secondary hypertension are the usage of certain medicines (corticosteroids, contraceptives and others), coarctation of the aorta, renal parenchyma disease, endocrine disorders (phaeochromocytoma, Cushing's syndrome, primary aldosteronism (2). World Health Organization defines arterial hypertension as a systolic blood pressure level at 140 mmHg or more and/or diastolic blood pressure at 90 mmHg or more in persons who do not take antihypertensive therapy (3).

Hypertensive crises represent severe clinical condition where the rapid rise in arterial blood pressure can lead to acute vascular damaging of vital organs (4). Hypertensive crises are defined by systolic blood pressure levels >180 mmHg and/or diastolic blood pressure levels >120 mmHg and they are often seen in patients with essential hypertension (5).

Depending on whether the vital organ damage is present or not, hypertensive crises occur as hypertensive emergency and hypertensive urgency. Hypertensive emergencies are life threatening conditions because their outcome complicates with acute damage of tar-

get organs. Hypertensive emergencies include hypertensive encephalopathy, hypertensive acute left ventricular failure combined with acute heart attack, or unstable angina, aortic dissection, different forms of arterial hypertension combined with subarachnoid bleeding or ischemic stroke (6).

Hypertensive urgency is present at 1 billion of world's population and it is responsible for 7.1 million of deaths in the world a year on average. It is estimated that almost 1% of the patients with hypertension will cause hypertensive crisis in a particular moment (7).

The hypertensive crises incidence/prevalence is rarely discussed in medical literature. Although the incidence of hypertensive crises is low (1%), the hypertensive crises are present at more than 500,000 Americans every year (8). Hypertensive crises are important and common event in urgent care medicine with higher frequency of hypertensive urgencies (76%) compared to emergencies (24%) (9).

The most important reasons for hypertensive crises occurrence are the patients' noncooperation, improper therapy, endocrinal diseases, renal disease, pregnancy, intoxication with drugs such as methamphetamine and cocaine (10). The pathophysiology of hypertensive crises has not been completely cleared. In pathophysiological sense the systemic circulation autoregulation disorder on the arteriole level is considered to be the cause of both forms of hypertensive crises (11).

The aim of the research is to determine the frequency of hypertensive crises in relation to age, gender, duration, and hypertension severeness.

2. EXAMINEES AND METHODS

The results of prospective research where the frequency of hypertensive crises was evaluated on the primary health care level were presented in this work. The research was conducted in the Emergency Medical Service Department of Health Care Centre Tuzla between November 2009 and April 2010. This research involved each consecutive patient between 30 and 80 years of age who came to be examined and treated in the Emergency Medical Service De-

partment. The research involved the total number of 180 hypertensive examinees divided into two groups: the control one (95) and the experimental one (85). The control group consisted of hypertensive patients with hypertensive crisis (hypertensive urgency and emergency).

The diagnosis of arterial hypertension was determined in accordance with the definition of the World Health Organization, according to which the hypertension is defined as the systolic blood pressure level at ≥ 140 mmHg and/or diastolic blood pressure at ≥ 90 mmHg in persons who do not take anti-hypertensive therapy (3). Hypertensive crisis is defined with the systolic blood pressure level at >180 mmHg and/or diastolic blood pressure level at >120 mm in accordance with the American National Institutes of Health guidelines (National Institutes of Health, National Heart, Lung and Blood Institute) (5).

The criteria for involvement into the research were the presence of arterial hypertension. The hypertensive patients with mental diseases, the patients in terminal level of a malignant disease, the patients on chronic dialysis program, the patients on cytostatic therapy and those on long-term corticosteroid therapy, and the patients on contraceptive therapy were excluded from the study.

The examinees involved into the research gave their voluntary written consent that they want to take part in the study in accordance to the Ethical Code (12).

The blood pressure was measured in all the patients with mercury sphygmomanometer, type Welch Allyn (SN 07319092504 Shock Resistant CE0297) with the cuff dimensions 34.3x11x25.3 cm. The blood pressure was measured in a sitting position after a 5 minute rest, using the standardized equipment and technique. The examinees with the blood pressure level $\geq 140/90$ mmHg were classified according to the recommendations of European Society of Cardiology and European Society of Hypertension (ESC/ESH) (13). The examinees in the control group had the blood pressure level at 140-179 mmHg for systolic and 90-119 for diastolic blood pressure. The examinees in the experimental group had the blood

pressure level at >180 mmHg for systolic and/or >120 mmHg for diastolic blood pressure, and they had been classified in two groups: the patients with hypertensive urgency (the condition with significant rise of the blood pressure without progressive vital organs damage) and the patients with hypertensive emergency (the condition with significant blood pressure rise with the presence of the vital organs damage) according to the American National Institutes of Health guidelines (National Institutes of Health, National Heart, Lung and Blood Institute) (5).

Descriptive statistical methods were used in the statistical data processing (central tendency measures, dispersion measures). For comparison of the proportions and mid values between groups we used Student's t-test. The statistical hypotheses were tested at the significance level $\alpha=0.05$, i.e the difference between the groups was considered statistically significant if $p<0.05$. Arcus Quickstat Biomedical statistical program was used in statistical data processing.

3. RESULTS

The study included 180 examinees: 72 men (40%) and 108 women (60%) in the prospective study by which the frequency and clinical presentation of hypertensive crises were evaluated at Emergency Medical Service Department of "Dr. Mustafa Šehovic" Health Care Centre With Polyclinics Tuzla. Women were statistically more involved than men ($p=0.007$).

Control group consisted of 95 (52.78%) examinees: 40 men (42.1%) and 55 women (57.9%), and experimental group consisted of 85 (47.22%) examinees: 32 men (37.64%) and 53 women (62.36%). Through the analyses of the examinees in the control and experimental group by gender, and starting from the calculated p values which were bigger than the significance level on which the testing had been performed $\alpha=0.05$ (5%), there was no statistical differences in proportions of the examinees in control and experimental according to gender.

Out of 85 examinees with hypertensive crisis, it was noted that there had been more hypertensive urgencies than

emergencies: 71(83.53%) vs. 14 (16.47%); ($p < 0.0001$). Hypertensive urgency had been present at 71 examinees: 26 (36.62%) men and 45 (63.38%) women, while 14 examinees had hypertensive emergency: 6 (42.86%) men and 8 (57.14%) women. There was no significant statistical difference in the proportion of examinees with hypertensive emergency and urgency in relation to gender ($p = 0.6598$). The distribution data on the examinees with hypertensive emergency and urgency are shown in Table 1.

Gender	Urgencies N %	Emergencies N %	Total N %	p
Men	26 36.62	6 42.86	32 37.65	0.6598
Woman	45 63.38	8 57.14	53 62.35	0.6598
Total	71 100.00	14 100.00	85 100.00	

Table 1. Examinees with hypertensive crisis gender distribution.

Age	Urgencies		Emergencies		Total		P
	N	%	N	%	N	%	
30-39	3	4.23	0	0	3	3.53	0,077
40-49	17	23.94	0	0	17	20.00	<0,0001
50-59	19	26.76	4	28.58	23	27.06	0.891
60-69	19	26.76	5	35.71	24	28.23	0.518
70-80	13	18.31	5	35.71	18	21.18	0.201
Total	71	100.00	14	100.00	85	100.00	

Table 2. Experimental group distribution by age

Duration of hypertension	Urgency		Emergency		P
	N	%	N	%	
Up to 10 years	49	69.01	6	42.86	0.068
11-20 years	19	26.76	6	42.86	0.258
> 20 years	3	4.23	2	14.28	0.297
Total	71	100.00	14	100.00	

Table 3. The distribution of examinees with hypertensive crisis considering the duration of hypertension

Gender	Experimental X ± SD	Control X ± SD	Total X ± SD	P
Men	203.59±22.79	165.75±10.35	182.56±25.38	<0,0001
Women	205.56±21.20	167.90±11.53	186.38±25.36	<0,0001
Total	204.82±21.70	167.00±11.04	184.86±25.37	<0,0001

Table 4. The average systolic pressure in patients in experimental and control group

Gender	Experimental X ± SD	Control X ± SD	Total X ± SD	P
Men	127.34±6.83	105.77±5.87	115.36±12.48	<0.0001
Woman	126.13±7.11	103.14±4.83	114.42±13.02	<0.0001
Ukupno	126.58±6.99	104.25±5.42	114.80±12.78	<0.0001

Table 5. The average diastolic pressure in patients in experimental and control group

tensive urgency had verified hypertension for not more than 10 years. 19 examinees (26.76%) had been treated for hypertension for the period between 11 and 20 years, and only 3 examinees (4.23%) had been treated for more than 20 years. There has been no statistically significant difference in proportion of examinees between these two groups. The data are shown in Table 3.

Through the analysis of time of arrival data it was discovered that the largest number of examinees from the control group (49.47%) and the experimental group (49.41%) arrived in the period between 6.00 p.m. and 11.59 p.m. There was no statistically significant difference found in proportion of examinees between the two groups.

The largest number of examinees with hypertensive urgency, 37 of them (52.11%) arrived in the period between

6.00 p.m. and 11.59 p.m. Out of 14 examinees left, classified as hypertensive emergency, the equal number of examinees, 5 of them (35.71%) arrived in period between 8.00 a.m. and 17.59. p.m. and between 6.00 p.m. and 11.59 p.m. There was no statistically significant difference in the proportion of examinees between the two groups. Tables 4 and 5 present the average level of systolic and diastolic blood pressure in control and experimental groups, according to gender. The average value of systolic blood pressure is 184.86 ± 25.37 mmHg. According to the results in Table 4, there is a statistically significant difference ($p < 0.05$) in the average value of systolic blood pressure in the examinees of both genders between the control and the experimental group ($p < 0.0001$). According to the results presented in Table 5, there is a statistically significant difference ($p < 0.05$) in the diastolic pressure average value in the examinees of both genders between the between the control and the experimental group ($p < 0.0001$), but there is no statistically significant difference in proportion of male and female examinees considering the tension values.

4. DISCUSSION

Hypertensive crises represent urgent conditions, often life threatening ones, characterized with sudden blood pressure rise and which are represented in more than 1/4 of all medical urgencies/emergencies. Almost by the rule, it still remains unexplained when and why a persistent and significant arterial blood pressure rise develops into hypertensive crisis. The fact is that in 50% patients with hypertensive crisis the disease deteriorates into that level asymptotically and hypertensive emergencies and urgencies are still, unfortunately, the least understood and the worst treated acute medical problems.

Unlike our study, Al-Bannay and Husain's cohort study, which examined the clinical presentation and comorbidity of hypertensive crises and which included 154 patients with systolic and di-

The research included the examinees between 30 and 80 years of age. Through the analysis of age representation in one gender, it was noticed that the largest number of male examinees (29.16%) belonged to the 40-49 years old age group, and the largest number of female examinees (28.70%) belonged to the 50-59 years old age group.

Through the data analyses of experimental group, considering the examinees age, i.e. those with hypertensive crisis, it was noticed that the largest number of examinees, the 24 (28.23%) of them belonged to the 60-69 years of age group: 19 urgencies (26.76%) and 5 emergencies (35.71%). Table 2 shows the age distribution of experimental group examinees. It can be seen from the table that there is statistically larger number of examinees between 40 and 49 years of age between the urgency and emergency conditions (23.94% vs. 20.00%; $p < 0.0001$). There were no statistically significant differences ($p > 0.05$) at other age groups. The average age of male examinees was 55.83 ± 11.06 years of age, and the average age of female examinees was 59.41 ± 11.97 years of age. There was no statistically significant difference in average age of both genders between control and experimental groups ($p > 0.05$).

Through the analyses of the duration of hypertension at examinees with hypertensive crisis it was discovered that 49 examinees (69.01%) with hyper-

astolic pressure >179 mmHg and >119 mmHg, concluded that 64.3% of the examinees had had hypertensive urgency, while hypertensive emergency had been present in higher percentage than in our results (35.7%). They have also presented that there were more men than women in their work (100:54) and that the largest number of the examinees belonged to 45-65 years of age group (14). Zampaglione's one-year long study shown that out of 14,029 patients that came to the Intern Medicine Emergency Service, 1634 (11.5%) of them were classified as hypertensive crisis, out of which there were 76% urgencies and 24% emergencies. It was noted that there were more women than men identified, similarly to our study. 23% of the patients did not know that they suffer from hypertension (9).

The data obtained in those studies differ from the data obtained in our research which showed a lot more hypertensive crises in the Emergency Medical Service Department (11.5% vs. 47.23%). Our results also showed that there were less hypertensive emergencies (16.47%), while the hypertensive urgencies were more present in our study compared to the data from Zampaglione's research (83.53% vs. 76%). Just like in Zampaglione et Al.'s study, there were more women than men, i.e. 63.38% as hypertensive urgency and 57.14% as hypertensive emergency.

If we, on the other side, compare the hypertensive urgency and emergency data percentages with the data from Martin et al., we can see that, out of 452 patients, there were 60.4% of hypertensive urgencies and 39.6% of hypertensive emergencies, which is a bit lower percentage of urgencies, and higher percentage for emergencies compared to the date obtained in our research. If we look back at the age of examinees with hypertensive urgency from this study, which is 59 ± 14.8 vs. 49.9 ± 18.8 years of age, we can see that the 60-80 years of

age was the most common group for hypertensive emergency (15).

It is interesting that in Zampaglione et al. study there was also the peak of hypertensive emergency examinees arrivals in periods at about 9.00 a.m. and between 7.00 p.m. and 8.00 p.m., and that is very close to the data that we obtained in this work (9).

5. CONCLUSIONS

In a prospective research including 180 examinees, there were 60% women and 40% men. The frequency of hypertensive crises in the Emergency Medical Service Department is high and it reaches 47.22%. The largest number of the examinees (28.23%) with hypertensive crisis belonged to the 60-69 years of age group. 64.70% of the examinees had had hypertension for not more than 10 years. Hypertensive urgencies were significantly more present in terms of statistics than the hypertensive emergencies (83.53% vs. 16.47%; $p < 0.0001$). There was no statistically significant difference in hypertensive crisis frequency due to gender, age and duration of the hypertension. The most frequent time interval when the patients with hypertensive crisis arrived to the Emergency Medical Service Department was in the period between 6.00 p.m. and 00.00. The average blood pressure in patients with hypertensive crisis was 204.82/126.58 mmHg.

There was no statistically significant difference found in the number of patients with hypertensive urgency and emergency considering age, gender and the duration of hypertension except in 40-49 years of age, where the presence of urgencies was statistically significant ($p = 0.407$).

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