Hypertensive crisis

Clinical presentation, comorbidities, and target organ involvement

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ABSTRACT

الأهداف: تقييم المعطيات السريرية والآثار الجانبية التي يعاني منها مرضى ارتفاع ضغط الدم.

الطريقة: لقد قمنا بالرجوع إلى المعطيات السريرية والآثار الجانبية التي يعاني منها مرضى ارتفاع ضغط الدم والتي تم جمعها خلال الفترة من يناير إلى نهاية إبريل 2009م في قسم الأمراض الباطنية بمجمع السلمانية الطبي، مملكة البحرين. ولقد تم جمع هذه المعطيات من 154 مريضاً يصل معدل ضغط دمهم الانقباضي إلى أعلى من 179م زئبقي فيما يصل ضغط دمهم الانبساطي إلى أعلى من 119م زئبقي. وهذا يتطابق مع التقارير التي توصل إليها المجلس الوطني حول مرض ارتفاع ضغط الدم.

النتائج: توصلت الدراسة إلى أن 64.3% من مجموع المرضى لا يعانون من تضرر الأعضاء الداخلية (ارتفاع ضغط الدم غير الطارئ والذي لايستدعي عملية جراحية)، فيما يعاني 35.7% من تضرر الأعضاء (ارتفاع ضغط الدم الطارئ والذي يستدعي عملية جراحية). ولقد استهدفت الدراسة الفئة العمرية من 45 عاماً حتى 65عاماً وهذا يمثل 56% من المرضى الذين تضمنتهم الدراسة، ولقد كانت فئة الذكور أكثر من النساء (100 من أصل 54). يرتبط كلاً من ضيق التنفس وبعض المشاكل العصبية بارتفاع ضغط الدم الطارئ فيما يرتبط الصداع وغشاوة النظر بارتفاع ضغط الدم غير الطارئ. ولقد كان مرض السكري من النمط الثاني (السكري البولي) عاملاً رئيسيا لمرض ارتفاع ضغط الدم.

خاتمة: لقد كان أكثر المرضى الذين تضمنتهم الدراسة مصابين بمرض ارتفاع ضغط الدم، وكان السكري مسبباً رئيساً لهذا المرض فيما تشير الدراسات إلى وجود علاقة بين ضغط الدم الطارئ وضيق التنفس وكذلك المشاكل العصبية.

Objectives: To evaluate the clinical presentation and comorbidities of hypertensive crisis in our own population.

Methods: In this cohort based study, we investigate the clinical presentation and comorbidities of hypertensive crisis by evaluating the data collected between January and April 2009. We included 154 patients admitted with systolic and diastolic blood pressure of >179 mm Hg and >119 mm Hg (based on the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure criteria) in the Department of Internal Medicine, Salmaniya Medical Complex, Kingdom of Bahrain.

Results: In the study population, 64.3% had hypertensive urgency (blood pressure elevation without end organ damage) and 35.7% had hypertensive emergency (blood pressure elevation with end organ damage). The mean age group was 45-65 years (56% of the study population) and more men were affected than women (100:54). Shortness of breath and neurological deficits had a strong statistical association with hypertensive emergency, and headache and blurring of vision had the same tendency toward hypertensive urgency. Diabetes mellitus was an independent risk factor for hypertensive crisis.

Conclusion: Most of the studied patients were known hypertensive. Diabetes mellitus is powerful predictor for hypertensive crisis. Dyspnea and neurological deficits have significant statistical correlation with hypertensive emergencies.

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Hypertensive crisis is a well-known clinical manifestation of high blood pressure. Its most frequent clinical features are chest pain, headache, dyspnea, palpitation, and neurological deficits. Syncope,

vomiting, epistaxis, drowsiness, and coma occur to a lesser extent. According to the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure,[1] hypertensive crisis is defined as systolic blood pressure >179 mm Hg and diastolic blood pressure >119 mm Hg. This condition is subdivided into hypertensive urgency and hypertensive emergency; the latter condition is associated with target organ damage. The commonly encountered hypertensive emergencies are acute pulmonary edema, acute coronary syndrome, and stroke (ischemic and non-ischemic). Less common presentations include aortic dissection, eclampsia, acute renal failure, and postoperative hypertension.[2] It is important to distinguish between hypertensive urgency and hypertensive emergency in order to formulate a therapeutic plan within a defined timeframe and reduce blood pressure to a safe level. Despite the clear definition, the approach to hypertensive crisis is controversial and is mainly related to the correct diagnosis and difficulties in assessment and differentiation of the subcategories. Further, this condition has not been extensively cited in the literature. Therefore, we aimed to evaluate the clinical presentation and comorbidities of hypertensive crisis in our own population.

Methods. The study was conducted at the Internal Medicine Department of Salmaniya Medical Complex, Manama, Kingdom of Bahrain from January 1, 2009 to April 31, 2009. Salmaniya Medical Complex, a university-affiliated hospital, is a referral center for secondary and tertiary treatment, with 24-hour medical care for approximately 1.2 million inhabitants who have free access to medical care through direct contact or referral from other medical services (governmental and private). The study was approved by the ethical and research committee of the institute. Informed consent was received prior to enrollment.

All patients over the age of 18 years who were admitted with hypertensive crisis were included in the study. Hypertensive crisis was defined according to the established criteria: systolic blood pressure >179 mm Hg or diastolic blood pressure >119 mm Hg.[1] Hypertensive urgency and hypertensive emergency were classified on the basis of the involvement of target organs at presentation. Blood pressure was measured using a Vital Signs 300 monitor (Welch Allyn, Inc., Skaneateles Falls, NY, USA) on 2 separate occasions (5 minutes apart); the highest value was then selected. This device has been validated for automated blood pressure monitoring.[3] A hypertensive emergency was distinguished from a hypertensive urgency on the basis of the clinical history, physical examination, and relevant diagnostic tests (blood test, chest x-ray, electrocardiogram and CT scan). In the absence of target organ involvement, all cases of hypertensive crisis were considered hypertensive urgency. A special data entry sheet was designed to enter the clinical information of each patient. In addition to the patient demographics, modes of presentation and comorbidities were recorded. A patient was considered to have diabetes if 2 readings of fasting blood glucose, taken on separate occasions, exceeded 7 mmol/L, if symptoms of diabetes occurred with casual plasma glucose concentration ≥200 mg/dl (11.1 mmol/L), or if the 2-hour post-load glucose level was ≥200 mg/dl (11.1 mmol/L) during an oral glucose tolerance test (OGTT).[4] Dyslipidemia (hypercholesterolemia) was diagnosed if the total cholesterol level exceeded 200 mg/dl.[5] Further, renal impairment was diagnosed when the estimated glomerular filtration rate (GFR) was <90 ml/min/1.73 m^2.[6] Patients age less than 18 or with uncontrolled hypertension were excluded from the study if their blood pressure level did not match the definition of the Joint National Committee for hypertensive crisis. Descriptive analysis of the qualitative variables and results were analyzed using Statistical Package for the Social Sciences (SPSS) Version 17 (SPSS-IBM, Chicago, IL, USA). Comparison of the patient characteristics between hypertensive emergency and hypertensive urgency was performed with chi-square test. P value <0.05 was considered the statistical cut-off.

Results. One hundred and fifty-four patients met the criteria for hypertensive crisis; 87 were Bahraini citizens (56.4%) and 67 (43.6%) were non-Bahrainis. The study population included more men: 100 (65%) men versus 54 (35%) women. Hypertensive crisis was more prevalent among the age group 46-65 years with no gender preference, constituting 56.4% of the total number of patients. The prevalence in the age groups 18-45 years and >65 years was almost equal, with the former and latter accounting for 22% and 21.8% of the study population. A higher number of patients presented with hypertensive urgency than with hypertensive emergency (65% versus 35%). Many patients with hypertensive emergency (mainly left ventricular failure) were aged between 46 years and 65 years. Thirty-one men and 24 women had hypertensive emergency, representing 56% and 44% of the total number of hypertensive emergencies. More women (44%) out of the total number of females presented with hypertensive emergency than men (31%) out of total number of males. Further, this condition was more common in the age group 45-65 years among the men and was dominated by acute coronary syndrome (**Figures 1 & 2**). Females, however, tended to present with hypertensive emergency >65 years, with left ventricular failure being the most common manifestation (**Figures 3 & 4**). A summary of the types of end organ damage seen in hypertensive

emergency is given in **Table 1**. Markedly, elevated systolic blood pressure (>179 mm Hg) was observed in 144 (93.5%) cases and diastolic blood pressure >119 mm Hg was measured in 85 (55.2%) cases. The high systolic blood pressure was significantly correlated (p<0.05) with hypertensive emergency related to acute coronary syndrome. Among the signs and symptoms of hypertensive crisis, headache, and blurring of vision were significantly associated with hypertensive urgency, and shortness of breath and neurological deficits were more likely to result in hypertensive emergency. Other modes of presentation such as chest pain and palpitations failed to show a statistical power in predicting hypertensive urgency versus hypertensive emergency, although they had a numerical significance (**Table 2**). The risk factors for hypertensive crisis were known as hypertension (87%), diabetes (45.5%), dyslipidemia (53%), smoking (32.5%), renal impairment (29%), and alcohol consumption (11%). Diabetes mellitus was a statistical significant risk factor for hypertensive crisis (p<0.05). Furthermore, the patient with diabetes had a greater tendency toward developing diastolic hypertensive crisis.

Discussion. In compliance with the definition of hypertensive crisis,[1] we found that hypertensive urgency (65%) was more common than emergency (35%) in the study population. Our observation of greater prevalence of hypertensive urgency is consistent with the litertures.[2,7] Most of the study population was male (65%); it follows that hypertensive emergencies were more common in this group (56%). The available data

Table 1 - Types of end organ damage associated with hypertensive emergencies (N=55).

Type of end organ damage	Number of cases (%)
Left ventricular failure	21 (38)
Acute coronary syndrome	18 (32.7)
Ischemic and non-ischemic strokes	16 (29.3)

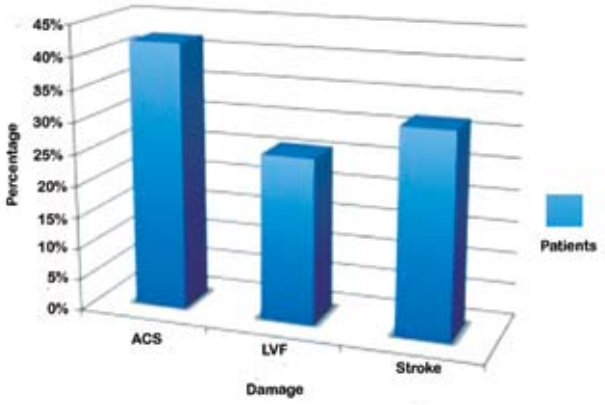

Figure 1 - Hypertensive emergencies among male group.

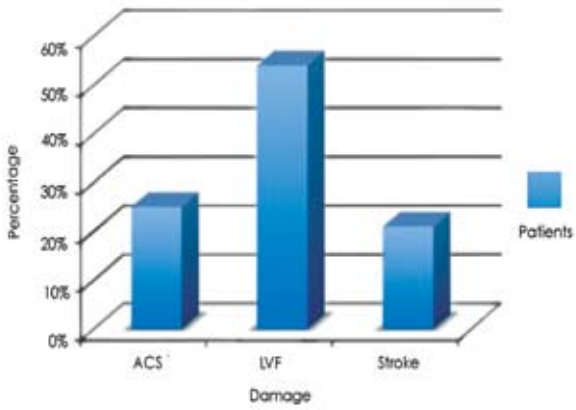

Figure 3 - Hypertensive emergencies among female group.

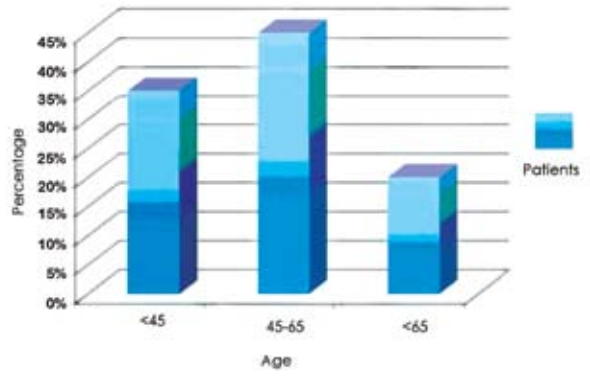

Figure 2 - Age distribution of hypertensive emergency among the male patients 198 x 119mm (96 x 96 DPI)

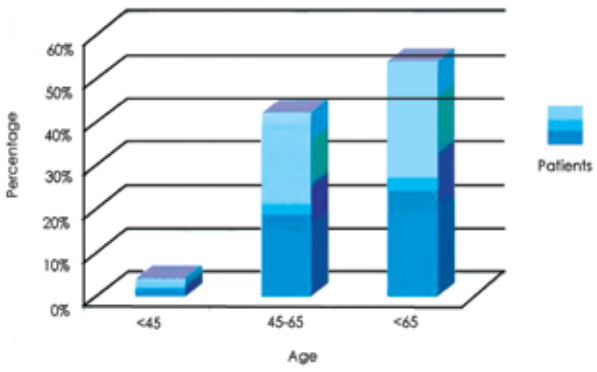

Figure 4 - Age distribution of hypertensive emergency among the female patients.

Table 2 - Frequencies of signs and symptoms associated with hypertensive.

Signs/ symptoms	Hypertensive crisis (%)	Hypertensive urgency (%)	Hypertensive emergency (%)	P-value
Headache	35.7	47.5	14.7	0.0001
Shortness of breath	35.0	23.2	56.4	0.0001
Neurological deficits	13.0	6.1	25.5	0.001
Chest pain	41.6	60.0	56.4	NS
Syncope	5.2	5.1	5.5	NS
Palpitations	21.5	51.5	48.5	NS
Vomiting	11.0	13.0	7.3	NS
Epistaxis	4.0	5.0	1.8	NS
Drowsiness	7.0	8.0	5.5	NS
Dizziness	21.0	25.0	12.2	NS
Blurring of vision	10.5	14.0	3.6	0.04
Others	13.6	15.0	11.0	NS

NS - not significant

on the gender distribution of hypertensive emergency is conflicting: the male gender (55.3%) was dominant in the Martin et al[7] study whereas Zampaglione et al[2] study had a slightly higher number of female (51%). Gender-specific fragmentation of our study population with hypertensive emergency showed that more women (44% of the total number of women) presenting with hypertensive crisis had hypertensive emergency, whereas 31% of the men had hypertensive crisis. This finding coincides with the latest evidence showing the dominance of hypertensive emergency among women.[8] There is lack of information regarding the relationship between gender and target organ involvement in hypertensive emergency. Men showed a greater tendency to present with acute coronary syndrome. Both regional (Gulf RACE)[9] and international (GRACE Registry)[10] databases suggest a higher incidence of acute coronary syndrome among men. A striking observation is the high incidence of left ventricular failure in hypertensive emergencies among women (54%). Interestingly, these patients fulfilled the criteria of diastolic heart failure, as the majority of their ejection fraction was >50% and demonstrated evidence of elevated filling pressure.[11] This phenomenon is very well supported in the literature, where the incidence of diastolic heart failure is shown to be disproportionately higher in the females.[12] We found a greater frequency of hypertensive crisis in the age group 46-65 years without a gender preference. Further analysis, however, demonstrated variability of the peaking age of hypertensive emergency in both genders. Hypertensive emergency occurred earlier in men than in women (46–65 years versus >65 years). This finding is consistent with the results of others.[2,7] The most frequently reported target organ damage in hypertensive emergency included left ventricular failure (38%), acute coronary syndrome (32.7%), and stroke (29.3%). In this context, there is great disparity among different the studies. Lanthier et al[13] ranked target organ damage in hypertensive emergency by the frequency of occurrence as heart failure (32%), stroke (23%), and myocardial ischemia (23%). Zampaglione et al,[2] however, observed that target organ damage was dominated by stroke (29%), heart failure (23%), and hypertensive encephalopathy (16%). In the Martin et al[7] study, 58% of the hypertensive emergencies were cerebrovascular complications whereas cardiovascular lesions accounted for 38%. The higher prevalence of cardiovascular emergencies in our study can be partially explained by the higher incidence of heart failure and acute myocardial infarction in the Bahraini population.[14] An important observation was the significant statistical association between systolic hypertension and acute coronary syndrome. The prognostic significance of systolic hypertension in predicting cardiovascular risk and outcome is well known.[15] Diastolic hypertension, however, demonstrated a significant association (p<0.05) with diabetes among the patients presenting with hypertensive emergency regardless of the affected target organs. This stresses the implicated risk of uncontrolled diastolic hypertension among patient with diabetes.[16] The reported signs and symptoms among the patients presenting with hypertensive crisis in order of frequency were chest pain (64%), headache (55%), shortness of breath (54%), palpitations (33%), dizziness (32%), neurological deficits (20%), vomiting (17%), blurring of vision (16%), drowsiness (11%), syncope (8%), and epistaxis (6%). We found that the most frequent signs for hypertensive emergency were shortness of breath and neurological deficits (p<0.05 in both cases). Hypertensive urgency had a statistical correlation with headache and blurring of vision (p<0.05). Some studies share similar observations,[1,5] although others failed to demonstrate powerful differentiating symptoms apart from dyspnea between hypertensive emergency and urgency.[13] The main cardiovascular risk factors were dyslipidemia (53%), diabetes mellitus (45.5%), smoking (32.5%), renal impairment (29%), and alcohol consumption (11%). Unfortunately, there are no impressive data on the prevalence of diabetes among patients with hypertensive crisis. The highly significant association between diabetes mellitus and hypertensive emergency, especially acute left ventricular failure (p<0.05), is a paramount observation. Diabetes is a significant independent predictor of hypertensive

emergency. This interesting association between diabetes and heart failure regardless of coexistent coronary artery disease is a challenging phenomenon being actively investigated and reported.[17] Although data on the significant risk factors of hypertensive crisis are scarce, Tisdale et al[18] suggested that uncontrolled hypertension in outpatient settings is a major determinant of hypertensive crisis. In our observation, most of the patients were known hypertensives (87%). This value is far greater than that reported in the literature (23%).[2,7] A possible explanation for this high incidence of known hypertensives in our study population is non-adherence to treatment; a clinical challenge faced in daily practice. Interestingly, non-Bahrainis constituted the bulk of the unknown hypertensives (60%). Most of these patients are manual laborers originating from societies of poor socioeconomic status, where they were deprived of easy access to well-structured medical care.

The limitation of our study must be acknowledged. The relatively short duration of observation might preclude the optimal clarification of the hypertensive crisis profile and target organ damage in the study population. Patients with eclampsia and pre-eclampsia were not included, because the obstetrics emergency room is a separate emergency department.

In conclusion, this study is the first in our country to address the importance of hypertensive crisis. Being a cohort-based study, it reflects daily practice. As the majority of the study population were known hypertensives, this reflects the poor adherence to treatment in our community. Patient education and motivation must be emphasized. Furthermore, diabetes mellitus is a powerful independent risk factor for predicting hypertensive crisis. Dyspnea and neurological deficits can be used to differentiate between hypertensive emergency and hypertensive urgency in the emergency room.

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