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Arterial Hypertension in Patients with Acute Coronary Syndrome

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ABSTRACT

Background. The aim of this study was to determine the incidence of arterial hypertension (AH) in patients with acute coronary syndrome (ACS) who were treated at the Department of Internal Medicine, University Hospital Mostar.

Methods: The study included 70 subjects with ACS, treated in the Internal Medicine Clinic of the University Hospital Mostar during a 1-year period (2019). All data were collected from the BIS system, based on medical records in the form of medical history. The monitored parameters were: age, gender, the presence of hypertension in the entities of ACS, systolic blood pressure (SBP) and diastolic blood pressure (DBP).

Main Findings: In the study, 72.6% of subjects were male and 27.14% were female. The women were older than men (69.32±10.94 vs. 61.20±10.028; p=0.004). There were 47.14% subjects with STEMI and NSTEMI, and 5.71% with unstable angina pectoris. The incidence of AH in patients with ACS was 61.43%. AH was more common in patients with NSTEMI than in other entities of ACS (48.8%). Men had higher SBP and DBP than women.

Principal Conclusions: The incidence of AH in patients with ACS was 61.43%. AH was more common in patients with NSTEMI.

Key words: hypertension, acute coronary syndrome, incidence

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INTRODUCTION

Arterial hypertension (AH) is the most commonly seen condition in primary health care (1) and it is a well-established risk factor for the development of atherosclerosis and an increased incidence of peripheral vascular disease, cerebrovascular disease, chronic renal disease and coronary heart disease. Etiologically, 89 – 94% (2) of hypertensive patients suffer from essential hypertension which is defined as an increase in blood pressure (BP) >140/90 mmHg, due to an unknown cause. The risk of developing lifelong hypertension is 90% for residents of industrialized countries, and in the USA the total number of patients exceeds 75 million (3). The incidence of arterial hypertension is expected to increase along with the aging population trend and with an increased incidence of obesity in the population (4). According to the World Health Organization, ischemic heart disease (IHD) was responsible for 8.1 million deaths worldwide in 2013 and the number of deaths from IHD has increased by 42% since 1990.

Acute coronary syndrome (ACS) includes unstable angina and myocardial infarction which is divided into ST- segment elevation myocardial infarction (STEMI) and myocardial infarction without ST- segment elevation (NSTEMI). In patients with STEMI, arterial hypertension is an independent factor for most adverse outcomes. A higher prevalence of arterial hypertension in NSTEMI in respect of STEMI patients (around 70 – 75% versus 30 – 40%) could be justified by the fact that NSTEMI patients are usually older and affected by more comorbidities compared to STEMI patients (5).

Certain studies have suggested that preexisting hypertension and elevated blood pressure (BP) at the point of admission contribute to a worse prognosis (6), while other studies have shown that preexisting hypertension might be protective in ACS patients in the short term, despite its clearly established role in increasing the long-term risk for coronary artery disease (7). To date, the associations between antecedent hypertension and microvascular injury after myocardial infarction is unclear. No specific relationship appears to exist between the location of the infarct and the presence of hypertension (8).

Systolic pressure is a major determinant of myocardial oxygen consumption and diastolic pressure has a critical relationship with coronary flow. Moreover, it is clear that both hypertension and hypotension will induce important and possibly adverse hemodynamic effects in acute myocardial infarction. Systolic and diastolic hypertension increase the risk of a myocardial infarction, and the higher the pressure, the greater the risk (9). The Lancet meta-analysis showed that, among people with SBP of ≥130 mmHg, a BP reduction of around 25% was beneficial in preventing myocardial infarction (10). An older retrospective analysis of the Gruppo Italiano per lo Studio della Sopravvivenza nell'Infarto Miocardico (GISSI-2) study documented that hypertension history was associated with greater in-hospital and 6-month mortality (11). Hypertensive STEMI patients showed a higher incidence of cardiogenic shock, pulmonary edema, ventricular tachycardia and/or fibrillation and third-degree atrioventricular block (12). In patients with cardiogenic shock, DBP <40 mmHg was independently associated with 28-day mortality, and SBP <110 caused death within 7 days to 1 year (13).

The early detection of patients having a high risk of ACS is a priority. Since hypertension and myocardial infarction are closely linked in several ways, a better understanding of this relationship will lead to more effective prophylaxis and management. In this paper, the incidence of arterial hypertension in patients with ACS in the observed period of the University Clinical Hospital in Mostar was examined.

MATERIALS AND METHODS

Subjects

This case-control study included 70 subjects with ACS, who were treated at the Department of Internal Medicine, University Clinical Hospital Mostar from January 1, 2019 to December 31, 2019. They were not directly involved in the research, as the data were collected from medical documentation. The main including criteria constituted male and female patients with ACS, and the excluding criteria were patients without ACS.

Methods

All data were collected from the hospital information system (BIS), based on medical records in the form of medical history. The monitored parameters were: age, gender, the presence of hypertension in entities of ACS, SBP and DBP. Hypertension is diagnosed when the average SBP is 140 mmHg or higher, or when the average DBP is 90 mmHg or higher, taken on 2 or more separate days.

Blood pressure measurement

The cuff should be inflated to a pressure of approximately 30 mmHg greater than the systolic, as estimated from the disappearance of the pulse in the brachial artery by palpation. An initial estimation of the systolic pressure by palpation avoids potential problems with an auscultatory gap. Korotkoff sounds transiently disappear as the cuff is deflated. Once the cuff is adequately inflated, the following steps should be followed: the stethoscope should be placed lightly over the brachial artery, since the use of excessive pressure can increase turbulence and delay the disappearance of sound. BP should always be taken with the patient's arm supported at the level of the heart. The cuff should deflate slowly at a rate of 2 to 3 mmHg per heartbeat. The sequence of sounds is as follows: phase 1, sudden appearance of sharp tapping sounds, considered to be SBP; phase 2, swishing sounds; phase 3, regular, louder sounds; phase 4, abrupt muffling of sounds and phase 5, loss of all sounds, considered to be DBP. The systolic pressure is equal to the pressure at which the brachial pulse can first be palpated, as blood flow is restored through the previously compressed vessel; the systolic pressure is also equal to the pressure at which the pulse is first heard by auscultation. As the cuff is deflated below the systolic pressure, the pulse continues to be heard until there is abrupt muffling, and 8 to 10 mmHg later, the sound disappears.

BP should be measured initially in both arms. If there is a disparity, due to a unilateral arterial lesion, the arm with the higher pressure should be used.

Subjects in this study had their BP measured on admission to the hospital, and some were initially diagnosed with hypertension, but this has not been accurately documented in the BIS.

Statistical analysis

The SPSS software (version 25,0; SPSS Incorporated Chicago, Illinois, USA) was used for statistical analysis of the obtained data. Continuous data were shown as mean ± standard deviation, while categorical variables were shown as integers and percentages. The χ^2 test was used to test the differences between the nominal variables, while the Student t-test for independent samples was used to analyze the differences between continuous variables. Values for $p<0.05$ were considered statistically significant.

RESULTS

Subjects with STEMI and NSTEMI were in a significant majority, compared to subjects with unstable angina pectoris (Table 1).

Table 1. Incidence of arterial hypertension and Representation of entities in ACS

	n	%	χ^2	p
High BP			3.657	0.056
Yes	27	38.6		
No	43	61.4		
ACS			24.029	<0.001
STEMI	33	47.1		
NSTEMI	33	47.1		
NAP	4	5.7		

In this study, male subjects were in the majority, which was statistically significant (Table 2).

Table 2. Frequency of AH by gender and ACS

	HBP				χ^2	p
	No		Yes			
	N	%	N	%		
Gender					0.009	0.925
M	19	70.4	32	74.4		
F	8	29.6	11	25.6		
ACS					0.577	0.794*
STEMI	14	51.9	19	44.2		
NSTEMI	12	44.4	21	48.8		
NAP	1	3.7	3	7.0		

Subjects, who did not have hypertension were younger, which was not statistically significant (Table 3).

Table 3. Mean age, SBP, DBP by gender

	Gender				t	p
	M		F			
	$\bar{X}$	SD	$\bar{X}$	SD		
Age	61.20	10.028	69.32	10.904	2.942	0.004
SBP	145.78	25.266	141.84	26.678	0.572	0.569
DBP	89.12	14.025	81.84	12.384	1.989	0.051

It can be seen that AH was more common in men and subjects with NSTEMI. Women were older than men and men had higher SBP and DBP. SBP was higher in subjects with STEMI and NSTEMI, in comparison to subjects with unstable angina pectoris. DBP was lower in subjects with STEMI and NSTEMI compared to subjects with unstable angina pectoris (Table 2).

DISCUSSION

In this research the incidence of arterial hypertension in patients with ACS was 61.43%. The data obtained are similar to data from other studies in which the incidence of hypertension varies from 31 to 59% (14,15).

In this research women were older than men, which proved to be statistically significant and is consistent with the literature where it is stated that the prevalence of AH is higher in men up to the sixth decade, and in women from the sixth decade. Subjects with AH and STEMI were represented in 44.2%, which is the same as in previous studies. The SYMPHONY study showed that the prevalence of AH was around 50% in patients with STEMI (16). The Spanish registry (PRIMVAC) reported a 46% prevalence of AH in STEMI patients (17). AH was more common in patients with NSTEMI than in other ACS entities, as demonstrated in other studies and was consistent with the hypothesis. Analyses from the Get with The Guidelines-Coronary Artery Disease national registry data of the American Heart Association have shown that among 100,889 patients diagnosed with AIM, 68% of patients with NSTEMI had a history of hypertension. A higher prevalence of AH in NSTEMI patients could be justified by the fact that NSTEMI patients are usually older and affected by more comorbidities (5), which was not proven in this research.

Lowering BP is a major determinant in reducing the risk of cardiovascular disease. The consequences of AH are very severe and therefore, need to be detected and treated in time.

CONCLUSIONS

The following conclusions emerging from this research are: the incidence of arterial hypertension in patients with ACS was 61.43%, and AH was more common in patients with NSTEMI.

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CONFLICT OF INTEREST
The authors declare no conflict of interest.

AUTHORS' CONTRIBUTIONS
Ivica Brizić - conceptualization, data curation, formal analysis, methodology, supervision, resources, validation, writing of original draft. Džejla Mahmutović wrote the manuscript with support from Ivica Brizić. All authors have read and agreed to the published version of the manuscript.

ETHICAL BACKGROUND

Institutional review board statement: The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of the University Hospital in Mostar
Informed consent statement: Informed consent was obtained from all subjects involved in the study.

Data availability statement: We deny any restrictions on the availability of data, materials and associated protocols. Derived data supporting the findings of this study are available from the corresponding author on request.

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