Abstract

The aim of this retrospective study was to determine the frequency of seeking medical help due to Hypertensio arterialis (AH) at the Institute of Emergency Medicine of the Split-Dalmatia County in South Croatia according to sex, age and time of year when seeking help. The subject sample included 6791 subjects who sought medical help primarily due to AH. The data were gathered in the period between 1st September 2013 and 1st September 2017. The study showed that the number of women who sought medical help was significantly higher (almost 60%), as compared to men. Women at the age of 50 years and older sought emergency medical help more frequently than men, who, in turn, at younger age sought help more frequently than women. About 40% of subjects involved in this study came to the Institute of Emergency Medicine during the four winter months, whereas significantly less patients sought medical help due to AH during warmer months, i.e., 25% of patients.

Key words: blood pressure, emergency room, sex, age, season

Introduction

When Stephen Hales measured arterial blood pressure in horses for the first time in 1733 (Hales, 1733), he was unaware of the fact that people can have high arterial blood pressure and that it can be bad for their health.

Arterial hypertension (AH) is one of the main dangers for cardiovascular illness and death in developed countries, and today even more prominent in developing countries. Besides being a factor for coronary disease, AH is an important factor for the occurrence of cerebrovascular incidents, heart failure, and chronic kidney disease (Vrhovac, 2008). Epidemiological studies have emphasized the close relationship between blood pressure and the incidence of cardiovascular diseases with mean blood pressure being considered as a major factor of left ventricular afterload (London & Pannier, 2010). However, several longitudinal studies have confirmed that arterial hypertension during childhood, especially in adolescence, is related to the changes of target organs at adulthood, increased carotid intima-media thickness (Juonala et al., 2010), increased pulse wave velocity (Koivistoinen, Hutri-Kahonen & Juonala, 2011), and left ventricular hypertrophy. Even though AH has been a much-addressed topic over the last thirty years, it appears that, considering the prevalence of AH, only a small step has been made regarding general knowledge of the overall population about AH and the awareness of one’s own health and treatment, which has been confirmed by numerous studies (Kearney et al, 2005).

A study conducted by NCD Risk Factor Collaboration (NCD-RisC) (2017) estimated that the number of adults with arterial hypertension increased from 594 million in 1975 to 1.13 billion in 2015, 597 million of patients being men and 529 million women. At global level, this increase has been attributed to population growth and ageing. In 2015, the prevalence of arterial hypertension standardized in relation to age was 24.1% in men and 20.1% in women, as stated in the aforementioned study. According to recent data, arterial blood pressure has been a persistent health issue in Central and Eastern Europe (NCD-RisC, 2017). Prevalence of hypertension in children has increased over the last years and it is now 2-3.6% in children aged from 8 to 18 years, and around 10% in adolescents at the age of 18. It has always been thought...
that hypertension is rare in childhood, and usually secondary, caused by kidney disease. However, the perception of hypertension in children has changed.

Primary hypertension is now one of the most common chronic diseases in adolescence (Litwin, Michalkiewicz & Gackowska, 2013). Longitudinal studies indicate a lower risk of hypertension and cardiovascular disease in persons who had been obese during adolescence and lost weight, and a higher risk for those who remained overweight and obese from childhood to adulthood (Suglia, Clark & Gary-Webb, 2013). Aside from the unquestionable genetic influence, today it is perfectly clear that arterial hypertension is greatly caused by lifestyle, it is developed during lifetime, and it is significantly determined by environmental determinants (Vasan, 2009). Diet and lifestyle changes can improve the control over arterial pressure and diminish the risk of complications, nevertheless, pharmacological treatment is often necessary in persons who have not made sufficient or effective changes in their lifestyle (Musini et al., 2009).

The aim of this retrospective study was to determine the frequency of seeking medical help due to AH at the Institute of Emergency Medicine of the Split-Dalmatia County in South Croatia according to sex, age and time of year when seeking help.

Methods

The subject sample was represented by a target group of 6971 patients (female, N=4111; male, N=2860) who sought medical help at the Institute of Emergency Medicine of the Split-Dalmatia County in Split and Kaštel Stari units in South Croatia with the diagnosis Hypertensio arterialis (AH) (arterial hypertension). Data for this retrospective study were gathered electronically, following the documented examination of patients in Split and Kaštel Stari units, based on the analyses of medical protocols of units/institutes in South Croatia. Electronically gathered data (the e-hitna programme) were related to the medical diagnosis, i.e., hypertension for sex, age, and time of the year.

The data were collected in the first half of November 2017.

The Institute of Emergency Medicine of the Split-Dalmatia County issued the permission for data gathering, as requested by the authors of this study. Patients’ right to privacy and protection of personal data was fully respected.

A retrospective data analysis was performed for the period from 1st September 2013 to 1st September 2017. The data analysis method included descriptive parameters: frequencies and relative values.

The results were statistically analysed by the Statistica Ver. 13.00 software and presented graphically and in tables.

Results and discussion

The division of subjects according to age is presented in Figure 1.

By analysing Figure 1., it can be seen that, out of the total number of patients who sought medical help at the Institute of Emergency Medicine of the Split-Dalmatia County, more than half of the patients were women, i.e., 4111 or 58.97%, whereas 41.03% or 2860 patients were men.

A study conducted by Yeasmine et al. (2017) showed increased frequency of cardiovascular diseases in women in postmenopause, which might be the consequence of hypertension caused by lower estrogen levels. The study was conducted with the aim of observing the association of hypertension with serum
estrogen level in postmenopausal women. The study showed that the association of hypertension with serum estrogen level in postmenopausal women existed (Yeasmin et al., 2017).

This retrospective study also points out that there was almost twice as many women who sought emergency medical help due to hypertension in comparison to men. Several recent studies have shown that blood pressure can be elevated due to oral contraceptives and, according to the published data, the frequency of this state ranges from 0% to 15.5% (Roberts, 1981).

Subgroups of men and women divided according to age are presented in Figure 2.

**Figure 2. Frequency of male and female subjects in relation to age**

The age of patients who sought help at the Institute of Emergency Medicine of the Split-Dalmatia County were divided into 10 categories. Most patients were in their fifties, sixties and seventies. Out of the total number of subjects, 71.45% were aged 50-80 years and 59.66% of them were women. In previous studies (Lewington et al., 2002), at ages 40-69 years, each difference of 20 mm Hg usual systolic blood pressure (or, approximately equivalently, 10 mm Hg usual diastolic blood pressure) is associated with more than a twofold difference in the stroke death rate. The results obtained by this study also showed the highest frequency for the ages of fifties, sixties and the seventies. In a prospective study, Lewington et al. (2007) also found that at older age (70-89 years), and especially for those with systolic blood pressure exceeding 145 mm Hg, the total cholesterol showed negative correlation with hemorrhagic stroke and overall stroke death rate. This retrospective study showed that 72.19% of women at the age of 80 and older sought medical help, in comparison to men.

It has been estimated that by the year 2025 the number of adults with hypertension will increase by 60% to the total of 1.56 billion (1.54-1.58 billion) (Kearney et al., 2005). High blood pressure is responsible for 54% of cerebrovascular incidents and 47% of ischaemic heart disease, and the majority of complications due to high blood pressure occur in the working age population (from age 45 to 69) (Lawes, Hoorn, & Rodgers, 2008). In the Republic of Croatia, according to the results of the Epidemiology of arterial hypertension in Croatia (EH-UH) study (Jelaković et al., 2007), the prevalence of AH in Croatia is 37.5%, which is congruent to the data from other European countries: England 37% (Primasteta et al., 2001), Italy 37.7% (Giampaoli et al., 2001), Sweden 38.4% (Stegmayr et al., 1996), Finland 48.7% (Kastarinen et al., 1998), Czech Republic 39.1% (Cifkova et al., 2004), Poland 44.5% (Zdrojewski et al., 2001), Spain 44.6% (Banages et al., 1998), and Germany 55.3% (Thamm M, 1999). As opposed to Europe, USA has a significantly lower prevalence of AH (28%).

According to the results of this study, the incidence of AH in young people aged 10 to 30 years is not negligible, as there were 108 patients from this age group who sought medical help at the Institute for Emergency Medicine of the Split-Dalmatia County. According to a study conducted in Croatia (Batinica, Alić & Božikov, 2017), investigating the incidence of AH in youth and athletes, prevalence of AH in soccer players was 40.5% (15/37), and in martial arts athletes 55.6% (15/27). Excessive body mass was recorded in 13.5% (5/37) soccer players and 33.3% (9/27) martial arts athletes ($\chi^2 = 3.588; p=0.058$). Positive correlation was found between excessive body mass and AH ($\chi^2 = 10.23; p=0.0014$). 811 patients who sought emergency medical help due to AH were aged 30-50 years, which is 11.63% of the total sample. However, in this age group, 59.92% of patients were men, which proves that women have less problems with AH at reproductive age. The frequency of seeking medical help according to the time of year is presented in Figure 3.
The total of 39.12% of subjects included in this study sought emergency medical help during the four winter months (November, December, January, and February), i.e., 2737 patients. The frequency of seeking help was the lowest in June (396 or 5.68%), and the highest in January (702 or 10.07%). Variations are often considered as an effect of climate, due to the close correlation observed in various countries and in different settings between temperature and blood pressure among children, adults, and specially the elderly (Modesti, 2013).

The effect of change in temperature on risk factors such as hypertension is often not taken into consideration regardless of the extensive literature on this phenomenon. Rosenthal (2013) reviewed numerous tests and studies which documented the correlation between temperature and blood pressure among adults, the elderly, and children in different countries. Twenty-four-hour blood pressure studies also generally show higher blood pressure in the winter, as reported by Rosenthal (2013). Lower blood pressure in warmer temperature is attributed to skin vasodilation and water and salt depletion due to perspiration, which is also the case in this study. The frequency of seeking help due to AH was significantly lower in warmer months (June, July, August, and September), i.e., 25% patients. A study conducted by Alpérovitch et al. (2009) indicated high correlation of outdoor temperature and blood pressure in the elderly, especially in those aged 80 years or older. During periods of extreme temperatures, a careful monitoring of blood pressure and antihypertensive treatment could contribute to reducing the consequences of blood pressure variations in the elderly. As the authors stated that the higher the temperature at follow-up compared with baseline, the greater the decrease in blood pressure.

Conclusion
The purpose of this retrospective study was to determine the epidemiological characteristics of patients who seek medical help due to AH at the Institute of Emergency Medicine of the Split-Dalmatia County, to determine the sex, the age and the time of the year with higher frequency of seeking medical help due to arterial hypertension. The World Health Organization reports mention arterial hypertension as the leading cause of death in the world. Moreover, AH is considered the primary risk factor for numerous cardiovascular and other related diseases, as well as diseases that increase cardiovascular risk. This retrospective analysis used data from patients who sought medical help at the Institute of Emergency Medicine of the Split-Dalmatia County, whereas other authors mostly examined data gathered at clinics of clinical medical centres or family medicine practice. The study showed that the number of women who sought medical help was significantly higher in comparison to men (60%). There were significant differences between the sexes according to age. Women at the age of 50 years and older seek emergency medical help more frequently than men, who, in turn, at younger age seek help more frequently than women. The age of 60-80 years is the age with the highest frequency of seeking medical help (51% patients, 62% of which were women). It seems that menopausal women seek medical help due to AH more frequently than men of the same age. According to the results of this retrospective study, the incidence of AH among young people aged 10-30 years is not negligible, as up to 108 subjects from this age group sought emergency medical help at the Institute of Emergency Medicine of the Split-Dalmatia County. About 40% of subjects involved in this study came to the Institute of Emergency Medicine during the four winter
months (November, December, January, and February), whereas significantly less patients sought medical help due to AH during warmer months (June, July, August, and September), i.e., 25% of patients.

References