Epidemiology of hypertension in the elderly

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Abstract

Background: Hypertension is significantly associated with the increased morbidity and mortality rates from cerebrovascular disease, myocardial infarction, congestive heart failure and renal insufficiency. Arterial hypertension is highly prevalent in the elderly, this article reviews on the epidemiological features of hypertension in the elderly.
Method and Material: We conducted a search of the literature in several databases (Medline, Scopus, EMBASE and CINAHL) to identify articles related to hypertension epidemiology. We also obtained relevant statistical information from the World Health Organization's internet database. The search was performed using the following key terms: hypertension, epidemiology, elderly, prevalence, incidence, risk factors, mortality, morbidity, treatment and prevention.
Results: Hypertension is highly prevalent in the elderly. Several epidemiological surveys conducted in the USA and Europe conclude that hypertension prevalence in the elderly ranges between 53% and 72%. Same prevalence patterns have been observed in Greece for this specific age group. High blood pressure values in the presence of several risk factors (obesity, diabetes mellitus, increased salt intake, hyperlipidemia, smoking, lack of physical activity, psychological factors, advanced age, sex) lead to a further increase of cardiovascular disease risk. Regular physical activity, the implementation of a healthy diet and medication are some of the preventive measures that can be adopted for the reduction of high blood pressure levels.
Conclusions: The most efficient treatment method of coronary heart disease is the administration of antihypertensive medications in the elderly since other interventions (physical activity, reduce of cigarette smoking, healthy diet) are not easily acceptable by the population.

Keywords: elderly, epidemiology, hypertension, prevalence, mortality, morbidity, prevention

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Introduction

Hypertension is not a chronic disease, but it is independently associated with cardiovascular diseases in the elderly. Although it constitutes one of the most frequent factors for cerebrovascular diseases, it is an amendable to modifications factor [1, 2].

It is an independent and powerful prognostic indicator for cardiovascular and renal disease, whereas it is significantly associated with the increased morbidity and mortality from cerebrovascular disease, myocardial infarction, congestive heart failure and renal insufficiency [3]. During the last years, hypertension treatment has led to an important decrease of cardiovascular mortality and to a delayed progression of renal disease development [4].

Secondary hypertension accounts for approximately 5-10% of all cases of hypertension and results from an underlying, identifiable cause. In the remaining 95% of the cases, no known cause is being recognized despite of the extensive medical examination (idiopathic or primary hypertension) [5].

The World Health Organisation (WHO) and the International Society of Hypertension (ISH) have adapted limits in order to define the various grades of hypertension, these guidelines have been reviewed and updated. The European Society of Hypertension (ESH) and the European Society of Cardiology (ESC) have issued guidelines that were adopted by the British Hypertension Society, these guidelines were more adapted to the European standards (table).

Table. Values of Systolic and Diastolic Blood Pressure (SBP, DBP, mm Hg) in the normal BP range and in the different grades of hypertension [6].

GRADE	SBP (mmHg)		DBP (mm Hg)
Optimum	<120	And/or	<80
Average normal	120-129	And/or	80-84
High normal	130-139	And/or	85-89
Mild (grade 1)	140-159	And/or	90-99
Moderate (grade 2)	160-179	And/or	100-109
Severe (grade 3)	≥180	And/or	≥110
Isolated systolic hypertension	≥150	And/or	≤90

The determination of a cut-off value discriminating between normal and pathologic blood pressure values is difficult to conduct. The established cut-off value between hypertension and normal arterial pressure is arbitrary and has been indirectly estimated through interventional studies that highlight the health benefits of blood pressure reduction [6]. According to the most recent National American Guidelines for Hypertension, values of 120-139mm Hg and 80-89 mmHg, for systolic and diastolic blood pressure respectively, are characterized as a precursor stage of hypertension, since these values are being associated with increased risk of hypertension development compared to lower values of arterial pressure [7].

Prevalence-Incidence

Arterial hypertension is a frequent disease in the developed countries, whereas in some of these countries it occurs in the 20-30% of the adult population [8]. Arterial hypertension is highly prevalent in the elderly, in this regard, according to NHANES III Study, its prevalence rate for subjects > 60 years old (white not Spanish speaking Americans) is estimated to be >60% [9].

Arterial hypertension prevalence rates differ significantly throughout countries, presenting higher values in Europe (44%) than in the United States (28%) [9, 10]. The prevalence rate of arterial hypertension in the African Americans is two times greater than the respective rate in the white Americans, whereas more serious complications are presented in the first origin group [9]. Several epidemiological surveys conducted in the USA and Europe conclude that hypertension prevalence in the elderly ranges between 53% and 72% [11].

In Greece, the results of the Nemea Study conducted by Skliros et al., [12] indicated that hypertension prevalence in the elderly aged >65 years old was 69%, whereas a lower prevalence rate (50%) was reported in the Didymos Study for the same age group [13]. Moreover, the highest prevalence rates have been reported for the age group of 65 – 74 years old –males vs. females 39.5%, 49.6%, respectively [14]. In another assay, conducted in the special infrastructures for the protection of the elderly in Greece, it has been reported that 72.9% of the males and 77.1% of females had high blood pressure [15], nevertheless, lower prevalence rates have been reported for the rural population –males vs. females 34.5% and 38.1%, respectively [16].

Hypertension prevalence increases with advancing age and is higher in men than in women until the age of 55 years old, however it is slightly higher in postmenopausal women [17]. Diastolic –related with age- blood pressure presents the higher values in the age of 55 years old, while systolic blood pressure continues to increase with advancing age. Systolic blood pressure is one of the most powerful indicators for cardiovascular risk in the elderly[17,18]. However, it is difficult to estimate the individual contribution of systolic and diastolic blood pressure in cardiovascular risk and this is mainly attributed to the fact that in the majority of the cases diastolic and systolic blood pressures are strongly correlated[18]. Systolic blood pressure increase in the elderly is accompanied by the increase of the differential blood pressure that constitutes an additional risk factor for cardiovascular disease even in individuals that do not present high levels of blood pressure [17].

In the Framingham study, it has been estimated that hypertensive subjects were 2 to 3 times more likely to develop coronary heart disease (angina pectoris, myocardial infarction, sudden death) compared to the healthy non-hypertensive population group. The risk is 3 times greater for cerebrovascular diseases and 3.5 times greater for heart failure[17]. More specifically, it has been reported that individuals with blood pressure values of 130-139/85-89 mmHg were significantly in higher risk of developing cardiovascular diseases compared to subjects with lower blood pressure values[19].

Morbidity

From an epidemiological point of view, the individual contribution of hypertension in the risk of cardiovascular diseases is extremely difficult to be estimated [17] since several other risk factors need to be considered, these include obesity, diabetes mellitus, increased salt intake, hyperlipidaemia, smoking, lack of physical activity, psychological factors, age and sex [20-23]. Each of these factors in the presence of high blood pressure can further increase the risk of cardiovascular diseases [1, 17].

Patients with diabetes mellitus type 2 are 1.5-2 times more likely to present hypertension compared to the general population[6]. The coexistence of these independent risk factors for cardiovascular diseases increases significantly the morbidity and the fatality rates[17]. This coexistence of hypertension and diabetes mellitus type 2 is more frequent in men and in lower socioeconomic levels. It increases with increasing age and in postmenopausal women after 50 years old [24].

Hypertension is simultaneously a cause and a consequence of renal disease. Severe hypertension has been documented to be a risk factor for renal disease, whereas the role of mild and moderate hypertension is less clear in the development renal failure [6]. Based on the Hellenic Society for the Study of Hypertension guidelines (2008) the aim of the screening of blood pressure in the hypertensive subjects under 65 years old is to maintain the blood pressure values of <140/90 mmHg and <130/80 mmHg in diabetic patients and patients with renal failure, respectively [25].

Alcohol abuse increases blood pressure and it has been shown that hypertension is difficult to be controlled in patients with a daily consume of more than two alcoholic drinks, in this regard, alcohol consume attenuates the antihypertensive agents action. However, the abrupt cessation of alcohol intake in individuals consuming great amounts of alcohol resulted in a rapid increase in their blood pressure. Alcohol exerts a protective effect in hypertensive patients if small amounts are being consumed -that is 20-30gr/per day and 10-20gr/per day for males and females, respectively [5].

The effects of obesity and hypertension are cumulative and several studies have documented that the coexistence of these factors increases the cardiovascular diseases' risk[11]. The average weight of hypertensive patients (hypertension of idiopathic etiology) is always greater than that of the persons with normal blood pressure values. Weight decrease leads to blood pressure reduction, but it also reduces the sodium-sensitivity of the hypertensive subjects. A weight loss of 10 Kg in overweight hypertensive patients results in blood pressure reductions of 5-20 mmHg [26].

Blood pressure increase is being associated with increased salt intake, with the elderly and the obese being the more sensitive. On the other hand, an inverse relationship between potassium dietary intake and blood pressure has been already described [27]. Normal blood pressure values in the vegetarians are being attributed to the high potassium intake; moreover, omega-3 or n-3 fatty acids are being associated with blood pressure reduction.

At population level, lifestyle changes should be encouraged. In DASH study, it has been shown that the combined effects on blood pressure of low sodium intake, of high fruit and vegetables intake and of the intake of low-fat dairy products were greater than the effect of an individual change, the above changes result in a reduction of systolic blood pressure of –8,1 to –6,0 mm Hg in hypertensive subjects belonging in the age group of 55-76 years old [28].

In TONE study it has been shown that the patients of 60-80 years old with regulated blood pressure that had discontinued the medication and had followed a weight loss program containing low sodium intake had a reduced risk of 45% to develop cardiovascular diseases compared to the subjects that hadn't changed their lifestyle [29]. In addition, the results of the same study indicated that either the reduction of low salt intake or weight loss in obese subjects for a 29 month period had led to a significant reduction (of 31%) of blood pressure prevalence, taking into the consideration the results of the TONE study, it is concluded that the dietary intervention is a practicable, safe and effective measure, even in the elderly [30].

The study of Pitsavos et al., [31] conducted in patients with regulated hypertension, found that with the combination of mediterranean diet and physical activity, the 33% of the acute coronary episodes could be prevented, Moreover, the above combination could lead to a reduction of 26% and 20% of the acute coronary episodes in non-treated hypertensive subjects and in patients with non regulated hypertension, respectively. Based on the results of the Attica study, the adherence on the mediterranean diet reduces cardiovascular risk either in subjects with normal blood pressure values or in hypertensive subjects and could contribute to hypertension control in the population [32] .

Smoking causes long and short-term increases either in systolic or in diastolic blood pressure values. Hypertension treatment and low cholesterol diet have no effect on hypertensive and hyperlipidemic smokers that are 9 times more likely to develop cardiovascular diseases compared to persons that do not smoke and have normal lipid levels [33, 34]. Although, the long term effects of smoking on blood pressure are less clear, the synergic impact of smoking and hypertension on cardiovascular risk is well [1].

Mortality

Based on WHO data, the total number of people with arterial hypertension worldwide is estimated to be about 600 millions and the annual mortality attributed to hypertension is calculated at about 7.14 millions deaths [35]. In 2002, for the age group of ≥60 years old for both sexes, the deaths that were attributed to hypertension were 735 per 100.000 people [36]. In Europe hypertension is estimated to be responsible for the 17% of the total annual mortality, about 680 thousands of deaths every year [35]. According to the National Statistics Service of Greece, in 2003, 1226 hypertension-related deaths were reported of which 1158 occurred in the age group of > 65 years old [37].

Treatment

Several studies have already described the benefits of healthy dietary patterns on blood pressure management. A diet rich in olive oil, fruits and vegetables, with low-fat dairy products and reduced saturated and total fat has been already suggested for the prevention and treatment of hypertension. The results of the Seven Countries Study have indicated an increase in several diet-dependent risk factors (increase in cholesterol levels, body mass index and hypertension prevalence) [38].
Regular exercise may be beneficial for both prevention and treatment of hypertension. In fact, moderate or low intensity exercise (such as walking, swimming, cycling) in hypertensive subjects may have an even greater blood pressure lowering effect than higher intensity training [27].
The use of antihypertensive medications for blood pressure regulation reduces cerebrovascular risk (by 34-42%), the risk of coronary heart disease (by 25-30%) and the risk of heart failure (by 50-54%) [39]. The absolute benefit in lives by this reduction is much higher in elderly than in younger age groups and this is attributed to the higher absolute risk in the elderly [40]. At population level, the most efficient treatment method of coronary heart disease is the administration of antihypertensive medications, the dietary interventions and interventions for increasing the physical activity and reducing cigarette smoking are not easily acceptable by the population [15].

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