Send Orders for Reprints to reprints@benthamscience.net

32 *The Open Hypertension Journal,* **2014**, *6,* 32-34

Open Access

EDITORIAL

Blood Pressure as a Risk Factor of Global Disease Burden and its Association with Lifetime Risks of Different Manifestations of Cardiovascular Disease

Michael Doumas[1,2], Konstantinos Tziomalos[3] and Vasilios G. Athyros[1,*]

[1]*Second Prop. Department of Internal Medicine, Medical School, Aristotle University of Thessaloniki, Hippocrates Hospital, Thessaloniki, Greece;* [2]*Veteran Administration Medical Center and George Washington University, Washington, DC, USA;* [3]*First Prop. Department of Internal Medicine, Medical School, Aristotle University of Thessaloniki, AHEPA Hospital, Thessaloniki, Greece*

Abstract: The evaluation of lifetime cardiovascular disease (CVD) risk and the life-years lost due to CVD in specific age groups in a population of 1.25 million people showed that not all elements of hypertension are causally associated with all manifestations of CVD. High systolic blood pressure (BP) was strongly related to intracerebral haemorrhage, subarachnoid haemorrhage, stable angina, myocardial infarction, and peripheral arterial disease (PAD). On the other hand, high diastolic BP had a stronger relationship with abdominal aortic aneurysm and pulse pressure had a stronger association with PAD and an inverse association with abdominal aortic aneurysm. Unstable angina was related to loss of life in younger ages, whereas heart failure and stable angina pectoris were related to years of life lost in the elderly. Thus, specific elements of BP were linked to specific manifestations of CVD and causes of death by CVD. Another recent study analysed the independent effects of 67 all-disease risk factors in 21 regions worldwide in 2010 and compared them with those of 1990. Hypertension immerged as the first cause of all-cause disease burden (7%), while in 1990 it was not included in the first 3 causes. A shift from communicable diseases of the children to the non-communicable diseases of the adults was also recorded in this 20-year period. A plethora of data suggests the hypertension is the number one killer both in Western World and Worldwide. The adoption of lifetime CVD risk estimates combined with efforts for increased awareness, education, and BP control will probably improve outcomes and substantially reduce CVD mortality.

Keywords: Diastolic blood pressure, hypertension, lifetime cardiovascular risk, pulse pressure, systolic blood pressure, worldwide burden of disease.

A recent publication from the United Kingdom [1] suggests that people aged 30 years or older with hypertension have a lifetime risk for overall cardiovascular disease (CVD) of 63% compared with 46% in those with normal blood pressure ($p < 0.0001$), and that the former develop overt CVD 5 years earlier than the latter ($p < 0.0001$) [1]. This analysis was based on electronic records of 1.25 million people initially free from CVD. Records from 1997 until 2010 were retrieved from the CArdiovascular research using LInked Bespoke studies and Electronic health Records (CALIBER) program [1]. During the 5.2 year follow-up, a total of 83,098 first CVD events were recorded [1]. High systolic blood pressure (BP) was strongly related to intracerebral haemorrhage, subarachnoid haemorrhage, stable angina, myocardial infarction (MI) and peripheral arterial disease (PAD). On the other hand, high diastolic BP had a stronger association with abdominal aortic aneurysm and pulse pressure had a stronger association with PAD (PP) and an inverse association with abdominal aortic aneurysm [1]. Thus, specific elements of BP were linked to specific manifestations of CVD [1]. Unstable angina was responsible for life lost in younger ages whereas heart failure (HF) and stable angina was related to years of life lost in the elderly [1]. The relationship between BP and CVD risk was linear even at very low BP levels, i.e. there was no evidence of a J-shaped relationship [1]. After adjustment for comorbidities, in the entire study population (30-95 years of age), 5 years of life were lost due to hypertension. In those aged 60-95 years, 3.5 years were lost, and in those aged 80-95 years, 1.7 years were lost [1]. The major contributor to mortality was the combination of both systolic and diastolic hypertension; isolated systolic hypertension played some role, mainly in the elderly whereas isolated diastolic hypertension had a negligible contribution to CVD mortality [1].

Two years ago, a meta-analysis of 11 randomized controlled trials (RCTs) including 8,912 participants (mean follow-up 4-5 years) suggested that in patients with stage I hypertension (systolic BP 140-159 mmHg and/or diastolic BP 90-99 mmHg) antihypertensive drugs do not reduce total mortality, coronary heart disease (CHD), stroke or total CVD events compared with placebo [2]. However, this finding

*Address correspondence to this author at the 2nd Pop. Department of Internal Medicine, Medical School, Aristotle University of Thessaloniki, Hippocrates Hospital, 15 Marmara St, Thessaloniki, 55132, Greece;
Tel: +30 2310 892606; Fax: +30 2310 835955;
E-mails: athyros@med.auth.gr or vathyros@gmail.com

1876-5262/14

does not appear to be valid when lifetime risk (which is more close to a "real life" setting) is taken into consideration [1, 3]. This concept provides support for starting treatment in patients with mild hypertension in a younger age [1, 3]. Besides, the comparison of the accuracy of 10-year Framingham risk score *vs*. the Multi-Ethnic Study of Atherosclerosis (MESA) age-adjusted 10-year risk for CVD and vs. the lifetime risk (LTR) for CVD shows that the longer the time of risk estimate and the greater the number of risk factors included the more accurate is the prediction [4]. And it is not only in the younger where it is appropriate to start targeting CVD risk factors. A large study evaluated the effect of CVD risk factor burden (including both systolic and diastolic hypertension) in middle-age men (n = 8,033) and women (n = 6,493) during 409,987 person-years of follow-up on lifetime probability for CVD- and non-CVD-related death [5]. In this study, subjects with a favourable risk factor profile (including absence of hypertension) in their middle age had a substantially lower lifetime risk for CVD death and a markedly longer life expectancy [5].

Another issue is that few patients with hypertension reach the target BP [6]. Data from a population of 330,000 subjects from Sweden showed that among hypertensive patients > 30 years-old, only 27% had a BP < 140/90 mmHg [6]. Thus, a lot has to be done to improve adherence to antihypertensive treatment and control, mainly with appropriate drug selection and/or with antihypertensive drug combinations [3]. For this reason it is very important to assess global CVD risk to improve the management of the individual patient [1, 3]. Despite the fact that there are many effective antihypertensive drugs at our disposal, the lifetime burden of hypertension remains high [1]. It seems that we need a new approach for BP-lowering strategies and new RCTs to define them [1].

These issues regarding hypertension represent a global problem and not just a problem in the UK only or in the Western world in general [7]. A recent study analysed the independent effects of 67 risk factors in 21 regions worldwide in 2010 and compared them with those of 1990 [7]. In 2010, the 3 leading risk factors for global disease burden were high BP [being responsible for 7.0% of global disability-adjusted life years (i.e. the sum of years lived with disability and years of life lost)], tobacco smoking (6.3%) and household air pollution from solid fuels (4.3%) [7]. Dietary risk factors and physical inactivity collectively accounted for 10% of global disability-adjusted life years, with the most prominent dietary risks being diets low in fruits and high in sodium [7]. In 1990, the leading risk factors were childhood underweight (7.9%), household air pollution (6.8%) and tobacco smoking (6.1%) [7]. It is evident that there has been a substantial change worldwide in the contribution of different risk factors to disease burden. There were also changes in causes of death with a shift from communicable diseases in children towards non-communicable diseases in adults [7]. These were attributed to decreased childhood mortality (halved from 1990 to 2010) and to the increase in life expectancy [7]. Among risk factors, lifestyle was the main cause that increased the prevalence of hypertension and rendered it most important risk factor worldwide [7]. In 2010, the major contributors to CHD-related disability-adjusted life-years were hypertension (with a 53% share), tobacco smoking (31%), dyslipidemia (29%), increased body-mass index (23%) and diabetes mellitus (16%) [7].

The concept that a lifetime risk score is more accurate in identifying subjects for intervention at a younger age as compared with a 10-year risk score is also supported by another recent large study [8]. Subjects from 563 general practices in England and Wales, free of CVD at baseline, and aged 30-84 years were analysed between 1994 and 2010. From this population, 2,343,759 comprised the derivation dataset and 1,267,159 comprised the validation dataset [8]. The developed risk model estimates the probability that a subject will be alive and free from CVD up to 95 years of age, taking into consideration individual CVD risk factors rather than using population values of life expectancy [8]. This model appears to be particularly more accurate in identifying high-risk subjects among men, non-white ethnic groups and subjects with a family history of premature CVD [8].

Hypertension is estimated to contribute more than 9 million deaths each year worldwide [9]. Therefore, there is a pressing need to develop new methods to increase disease awareness and improve control, mainly with drug combinations and better patient compliance in order to maximize the protection from CVD, prolong survival and improve quality of life. The lifetime estimate of CVD risk in patients with hypertension will contribute substantially. In UK for example there has been during the last 15 years a substantial increase in awareness, treatment, and control of hypertension as well as in the adoption of lifetime CVD risk estimates [8, 10, 11]. Hypertension, this contemporary Minotaur, has claimed a lot of lives until now. Let's leave him hungry, or at least undernourished, from here on.

CONFLICT OF INTEREST

This editorial was written independently. The authors did not receive any financial or professional help with the preparation of the manuscript. There is no conflict of interest.

ACKNOWLEDGEMENTS

Declared none.

REFERENCES

[1] Rapsomaniki E, Timmis A, George J, *et al.* Blood pressure and incidence of twelve cardiovascular diseases: lifetime risks, healthy life-years lost, and age-specific associations in 1.25 million people. Lancet 2014; 383: 1899-911.

[2] Diao D, Wright JM, Cundiff DK, Gueyffier F. Pharmacotherapy for mild hypertension. Cochrane Database Syst Rev 2012; 8: CD006742.

[3] Kahan T. Focus on blood pressure as a major risk factor. Lancet 2014; 383: 1866-8.

[4] Villines TC, Taylor AJ. Multi-ethnic study of atherosclerosis arterial age versus framingham 10-year or lifetime cardiovascular risk. Am J Cardiol 2012; 110: 1627-30.

[5] Lloyd-Jones DM, Dyer AR, Wang R, Daviglus ML, Greenland P. Risk factor burden in middle age and lifetime risks for cardiovascular and non-cardiovascular death (Chicago Heart Association Detection Project in Industry). Am J Cardiol 2007; 99: 535-40.

[6] Qvarnström M, Wettermark B, Ljungman C, *et al.* Antihypertensive treatment and control in a large primary care population of 21 167 patients. J Hum Hypertens 2011; 25: 484-91.

[7] Lim SS, Vos T, Flaxman AD, *et al.* A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and

risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet 2012; 380: 2224-60.

[8] Hippisley-Cox J, Coupland C, Robson J, Brindle P. Derivation, validation, and evaluation of a new QRISK model to estimate lifetime risk of cardiovascular disease: cohort study using QResearch database. BMJ 2010; 341: c6624.

[9] [No authors listed]. Hypertension: an urgent need for global control and prevention. Lancet 2014; 383: 1861.

[10] Falaschetti E, Chaudhury M, Mindell J, Poulter N. Continued improvement in hypertension management in England: results from the Health Survey for England 2006. Hypertension 2009; 53: 480-6.

[11] Falaschetti E, Mindell J, Knott C, Poulter N. Hypertension management in England: a serial cross-sectional study from 1994 to 2011. Lancet 2014; 383: 1912-9.

Received: May 06, 2014 Revised: June 20, 2014 Accepted: June 25, 2014