Πρωτότυπη εργασία

*Blood pressure target attainment according to the recent cardiovascular prevention guidelines issued by the European Society of Cardiology

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SUMMARY

Introduction: New cardiovascular prevention guidelines have recently been issued by the European Society of Cardiology (ESC). *Purpose:* To record blood pressure (BP) target attainment according to the recent ESC cardiovascular prevention guidelines. *Methods:* A retrospective observational study involving 1,334 dyslipidemic patients followed-up for ≥3 years at the Outpatient Lipid Clinic in University General Hospital of Ioannina, Greece. BP target attainment was recorded. ESC 2021 guidelines recommend a general target of BP <140/80 mmHg and individual targets of: i) diastolic BP <80 mmHg in all patients and ii) systolic BP 120-130 mmHg in patients 18-69 years of age without chronic kidney disease, or systolic BP 130-140 mmHg in patients 18-69 years of age with chronic kidney disease, or in those ≥70 years of age. *Results:* Among the 1,334 subjects, 935 [45% men, 68 (60-75 years old)] were diagnosed with hypertension and received antihypertensive treatment. Of those, 40% were ≥70 years old, 19% were diagnosed with chronic kidney disease, 24% with atherosclerotic cardiovascular disease and 23% with type 2 diabetes. Of those, 75% were receiving an angiotensin receptor blocker, 52% a thiazide diuretic, 52% a calcium channel blocker, 37% a beta-blocker, 13% an angiotensin converting enzyme inhibitor, 6% an aldosterone receptor blocker and 2% a centrally acting antihypertensive drug. Half of subjects had BP <140/80 mmHg, but only 21% achieved the individualized BP targets. *Conclusions:* A considerable proportion of hypertensive patients do not achieve target BP values.

Key-words: blood pressure, target, treatment

INTRODUCTION

A plethora of observational and genetic epidemiological studies, along with randomized clinical trials (RCTs) have shown that hypertension is a major cause of cardiovascular disease (CVD), accounting for 9.4 million deaths and 7% of global disability adjusted life-years.[1-3] The risk of death from either coronary artery disease or stroke increases linearly from blood pressure (BP) levels as low as 90 mmHg systolic and 75 mmHg diastolic upward, whereas the

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absolute benefit of reducing systolic BP (SBP) depends on the cardiovascular risk and the absolute SBP reduction.[1,4] Despite the available effective blood-pressure lowering therapies, a significant proportion of the hypertensive patients fail to control their BP levels in clinical practice.[5-7] In addition, the guidelines for the management of arterial hypertension have been revised during the last decade, due to tolerability and safety considerations concerning the lower BP limits.[1,8-10]

In this context, the aim of the present study was to record the rates of BP target attainment according to the cardiovascular prevention guidelines recently issued by the European Society of Cardiology (ESC) in 2021.

METHODS

This was a retrospective study including 1,334 consecutive adult patients with dyslipidemia who attended the Outpatient Lipid Clinic of the University Hospital of Ioannina in Greece for ≥3 years (from 1999 to 2015).[11]

All study participants were Caucasians of Hellenic origin. A complete assessment of their clinical and laboratory profile was performed at the baseline visit, after 6 months and at the most recent visit. Office BP measurements were based on ESC/European Society of Hypertension (ESH) guidelines and performed with a validated upper-arm cuff BP measurement device and an appropriate cuff size. Study participants were diagnosed with hypertension according to ESC/ESH guidelines or in case of concomitant antihypertensive treatment.[1]

For the present analysis, we recorded subjects' BP target attainment according to the recent ESC 2021 guidelines at their most recent visit.[1] These recommend a general target of BP <140/80 mmHg and individual targets of: i) diastolic BP <80 mmHg in all patients and ii) systolic BP 120-130 mmHg in patients 18-69 years of age without chronic kidney disease, or systolic BP 130-140 mmHg in patients 18-69 years of age with chronic kidney disease, or in those ≥70 years of age.

Statistical analysis

Continuous variables were tested for normality by the Kolmogorov-Smirnov test and logarithmic transformations were performed if necessary. Data are presented as mean ± standard deviation (SD) and median [interquartile range (IQR)] for parametric and non-parametric data, respectively. For categorical values, frequency counts and percentages were applied. Dependent sample t-test, parametric or non-parametric, was performed to compare the change of the variable of interest within the same group. Two-tailed significance was defined as $p < 0.05$. Analyses were performed with the Statistical Package for Social Sciences (SPSS) v21.0 software (SPSS IBM Corporation, Armonk, New York, USA).

Table 1. Subjects' characteristics

Variables	
Sex (male), %	45
Age, years	60 (52-67)
Age ≥70 years old, %	40
Atherosclerotic cardiovascular disease, %	24
Coronary heart disease, %	11
Stroke, %	11
Peripheral artery disease, %	3
Aortic abdominal aneurysm, %	1
Atrial fibrillation, %	1
Heart failure, %	1
Type 2 diabetes mellitus, %	23
Weight status	
Normal weight, %	17
Overweight, %	50
Obesity, %	33
Chronic kidney disease, %	19
Metabolic syndrome, %	52
Smoking	
Non-smokers, %	68
Former smokers, %	16
Smokers, %	16
Fasting plasma glucose, mg/dL	98 (90-109)
Body mass index, kg/m^2	28.7 (26.2-31.9)
Waist, cm	100 (93-107)
Systolic blood pressure, mmHg	130 (123-138)
Diastolic blood pressure, mmHg	78 (72-84)
Estimated glomerular filtration rate, mL/min/1.73 m^2	67.2 (89.6-78.5)
Total cholesterol, mg/dL	171 (149-193)
Triglycerides, mg/dL	111 (85-151)
High-density lipoprotein cholesterol, mg/dL	52 (44-61)
Low-density lipoprotein cholesterol, mg/dL	92 (75-111)
Concomitant treatment	
Lipid lowering therapy, %	93
Glucose lowering therapy, %	23
Antiplatelet therapy, %	40

Variables are expressed as median (interquartile range), unless percentages are shown

RESULTS

Among the 1,334 subjects, 935 [45% men, 68 (60-75 years old)] were diagnosed with hypertension and received antihypertensive treatment. As shown in Table 1, 40% of those were ≥70 years old, 24% were diagnosed with atherosclerotic cardiovascular disease, 23% with type 2 diabetes and 19% with chronic kidney disease.

As far as the subjects' antihypertensive therapy is concerned, 75% were receiving an angiotensin receptor blocker (ARB), 52% a thiazide diuretic, 52% a calcium channel blocker (CCB), 37% a beta-blocker, 13% an angiotensin converting enzyme inhibitor (ACEi), 6% an aldosterone receptor blocker and 2% a centrally acting antihypertensive drug. The majority of the study participants received dual (37%) or triple combination (28%). Only 21% of the study participants were on antihypertensive monotherapy and 14% were treated with ≥4 blood pressure-lowering drugs.

During their 6-year follow-up, subjects' SBP declined from 144 (130-160) mmHg to 130 (123-138) mmHg ($p < 0.05$), and DBP from 90 (80-96) mmHg to 78 (72-84) mmHg ($p < 0.05$). Half of subjects had BP <140/80 mmHg, but only 21% achieved the individualized BP targets. Specifically, 19% of the patients 18-69 years of age without chronic kidney disease had optimal BP levels, whereas 12% of those with chronic kidney disease and 32% of the elderly achieved the proposed BP targets.

DISCUSSION

To the best of our knowledge, our study is the first to evaluate the rates of BP target attainment according to the recent ESC cardiovascular prevention guidelines. Nevertheless, our results showing low rates of BP target attainment in clinical practice are in line with previously published studies.[5,6] An analysis of data from medical databases derived from 7,092 treated hypertensive adult outpatients in three excellence hypertension centers demonstrated a similar treatment pattern to ours.[5] ARB/ACEi were the cornerstone antihypertensive therapy (77%) followed by calcium channel blockers (27%), beta-blockers (36%) and diuretics (13%), whereas the prescription rate of combination therapies was 51%. Only 20% of the study participants achieved optimal BP levels according to the ESC/ESH 2018 guidelines.[5] Likewise, another cohort (n=5,308) has recently demonstrated low attainment rates of the BP targets recommended by the American (ACC/AHA, 2017), European (ESC/ESH, 2018), United Kingdom (NICE, 2019), and International Society of Hypertension (ISH, 2020) guidelines.[6] In that study, 28.4% of the antihypertensive drugs were prescribed as a combination therapy, whereas the most frequently used antihypertensive drugs were ARB/ACEi (31.4%), calcium channel blockers (CCBs) (17.5%) and beta-blockers (15.4%).[6] Although the rate of NICE 2019 BP target (<140/90 mmHg or <150/90 mmHg for the patients ≥80 years of age) attainment was 65.6%, the corresponding stricter BP targets were lower (39.5%, ACC/AHA 2017; 43%, ESC/ESH 2018; and 40.8%, ISH 2020).[6] Therefore, 'stricter' BP targets seem difficult to be achieved in clinical practice, as already noticed in the case of the individualized BP targets in our study.

There are several reasons that might account for this poor goal achievement in clinical practice. Although we were unable to identify any potential risk factor accounting for low BP target attainment in our study, a post-hoc analysis of the SPRINT trial has previously shown that patients' older age, higher SBP, underlying chronic kidney disease, higher number of antihypertensive drugs and moderate cognitive impairment were associated with failure to achieve the intensive SBP target.[7] Patients' compliance with treatment also merits a major role. Thus, patient education and the availability of fixed-dose combinations; might improve their adherence.[11]

The current study has some limitations. First, the present study relied on office-based BP measurements. Thus, no data on white-coat or masked hypertension was available. Second, due to the retrospective design of our study, we were unable to obtain complete information regarding factors associated with BP target attainment, such as physical activity, some cardiometabolic risk factors, and diet. Finally, our data were collected before the announcement of the current ESC 2021 guidelines (1999-2015).

CONCLUSIONS

The present study shows that a considerable proportion of hypertensive patients do not achieve the proposed BP targets recommended recently by the ESC. Considering the fact that hypertension is a modifiable cardiovascular risk factor, continued efforts to optimize BP control by confronting any potential risk factors and improving patients' compliance are imperative in everyday clinical practice.

ΠΕΡΙΛΗΨΗ

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Επίτευξη των στόχων αντιυπερτασικής αγωγής σύμφωνα με τις πρόσφατες κατευθυντήριες οδηγίες καρδιαγγειακής πρόληψης της Ευρωπαϊκής Καρδιολογικής Εταιρείας.

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Εισαγωγή: Πρόσφατα ανακοινώθηκαν οι κατευθυντήριες οδηγίες για την αντιμετώπιση της αρτηριακής υπέρτασης από την Ευρωπαϊκή Καρδιολογική Εταιρεία (ESC). *Σκοπός:* Η καταγραφή του ποσοστού επίτευξης των προτεινόμενων στόχων της αντιυπερτασικής αγωγής σύμφωνα με τις πρόσφατες κατευθυντήριες οδηγίες καρδιαγγειακής πρόληψης ESC 2021. *Μέθοδοι:* Πρόκειται για μια αναδρομική μελέτη παρατήρησης, στην οποία συμμετείχαν διαδοχικοί ενήλικες ασθενείς με δυσλιπιδαιμία που παρακολουθήθηκαν για ≥3 χρόνια στο εξωτερικό Ιατρείο Διαταραχών του Μεταβολισμού των Λιπιδίων και Παχυσαρκίας του Πανεπιστημιακού Γενικού Νοσοκομείου Ιωαννίνων. Καταγράφηκε το ποσοστό επίτευξης των στόχων της αντιυπερτασικής αγωγής. Οι πρόσφατες οδηγίες ESC 2021 προτείνουν τον γενικό στόχο ως ΑΠ <140/80 mmHg και τους εξατομικευμένους στόχους ως εξής: i) διαστολική ΑΠ <80 mmHg σε όλους τους ασθενείς και ii) συστολική ΑΠ 120-130 mmHg σε ασθενείς 18-69 ετών χωρίς χρόνια νεφρική νόσο ή συστολική ΑΠ 130-140 mmHg σε ασθενείς 18-69 ετών με χρόνια νεφρική νόσο ή σε εκείνους με ηλικία ≥70 ετών. *Αποτελέσματα:* Από τους 1,334 ασθενείς, 935 [45% άνδρες, 68 (60-75 ετών)] ελάμβαναν αντιυπερτασική αγωγή. Από αυτούς, 40% είχαν ηλικία ≥70 ετών, το 19% είχε διαγνωσθεί με χρόνια νεφρική νόσο, το 24% με καρδιαγγειακή νόσο και το 23% με σακχαρώδη διαβήτη. Όσον αφορά το είδος των αντιυπερτασικών φαρμάκων, το 75% των ασθενών ελάμβανε έναν αναστολέα των υποδοχέων της αγγειοτενσίνης, το 52% ένα θειαζιδικό διουρητικό, το 52% έναν ανταγωνιστή διαύλων ασβεστίου, το 37% έναν β-αποκλειστή, το 13% έναν αναστολέα του μετατρεπτικού ενζύμου της αγγειοτενσίνης, το 6% έναν αναστολέα του υποδοχέα της αλδοστερόνης και το 2% έναν κεντρικώς δρων αντιυπερτασικό φάρμακο. Οι μισοί ασθενείς είχαν ΑΠ <140/80 mmHg, αλλά μόνο το 21% είχε πετύχει τους εξατομικευμένους στόχους της αντιυπερτασικής αγωγής. *Συμπεράσματα:* Ένα σημαντικό ποσοστό ασθενών δεν επιτυγχάνει τους στόχους της αντιυπερτασικής αγωγής στην καθημερινή κλινική πρακτική.

Λέξεις-κλειδιά: αρτηριακή πίεση, στόχοι, θεραπεία

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