What a High Prevalence of White Coat Hypertension in Society!

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Abstract

Background There are many patients in society using antihypertensive medication, which has been initiated just after a single office measurement but actually they are normotensive and in contrast, there are many patients not using any antihypertensive medication because of a normal blood pressure (BP) at the doctor’s office but they are actually hypertensive.

Materials and Methods We randomly took 438 consecutive patients. Clinical BP was measured by the same physician, and a 10-day twice daily home blood pressure measurement (HBPM) and 24-hour ambulatory blood pressure measurement (ABPM) were obtained.

Results Among 438 patients, 170 (38%) normotension (NT), 190 (43%) white coat hypertension (WCHT), 10 (2%) masked hypertension (MHT), and 68 (15%) sustained hypertension (HT) cases were detected. Although the prevalences of sustained HT and MHT increased by decade, the prevalence of WCHT was much higher in all decades until the eighth decade. Even in the second decade, its prevalence was 33% and higher than 45% in the third, fourth, and fifth decades of life. No statistically significant difference was found for number of WCHT, MHT, and sustained HT cases between ABPM and HBPMs.

Conclusion HBPM should be the preferred method of diagnosis of WCHT, MHT, and sustained HT against conventional BPM at the doctor’s office and even ABPM due to its simplicity and equal effectiveness with ABPM. It should be applied to every patient above the age of 40 years once a year due to high prevalences of sustained and masked HT cases. Additionally, due to the very high prevalences of WCHT even in the very early decades, WCHT should be thought of as a normal response of the body against various stresses and its management should be limited to annual follow-up with HBPMs.

Key words: White coat hypertension, masked hypertension, sustained hypertension

Introduction

A normal blood pressure (BP) should ideally be determined in terms of cardiovascular risk. Generally, hypertension (HT) is defined as systolic BP of ≥135 mmHg and/or diastolic BP of ≥85 mmHg on average home measurement. HT increases risks of major cardiovascular events (cardiovascular death, myocardial infarction and stroke) and renal failure. Thus BP control is the main point for prevention of progression of cardiorenal disease. But diagnosis and management of HT is complicated by the fact that BP varies greatly, depending on physical and mental stresses. Furthermore, the elderly population tends to have an abnormal circadian rhythm and a normally higher systolic BP than younger subjects. In addition, in the doctor’s office in particular, measurements are often too high; this is termed “white coat hypertension” (WCHT). WCHT is defined as office BP of ≥140/90 mmHg either for systolic or diastolic or for both but home BP of <135/85 mmHg for both. Most expert committees concur with the idea that levels of the self-measured BP at home <135/80 mmHg both for systolic and diastolic are normal (1). As another handicap of the office BP measurements, masked hypertension (MHT) is defined as office BP <140/90 mmHg both for systolic and diastolic but home BP ≥135/85 mmHg either for systolic or...
diastolic or for both and it may be together with already existing sequelas of HT. So conventional BP measurements may not identify some individuals at high or low risk for HT.

A practicable and inexpensive supplementary method to avoid inaccurate results is measurement of BP by the patient his or herself at home. This approach may enable numerous measurements to be obtained, which may more accurately reflect the real situation than one-off measurement in the physician’s office. Since home blood pressure measurement (HBPM) is easily accepted by patients, it is reasonable to recommend taking measurements. For example, in the Ohasama study, the self-measured BP at home (mean of three to 38 measurements) was a better predictor of total mortality than office measurements at screening (2). The authors have used a schedule for HBPM with a single morning measurement and advised taking as many measurements as possible (preferably more than 14) for the best prediction of stroke risk. On the other hand, as some studies were terminated until more prospective data become available, conventional measurements at the doctor’s office should remain the standard method for evaluating BP, and management of HT exclusively based on self-measurement of BP at home cannot be recommended (3).

The prognostic significance of WCHT remains controversial and still little is known about it. There are various reports about the prevalence and significance of WCHT. Whether or not individuals with WCHT have an abnormal autonomic-cardiac regulation, similar to that observed in sustained or persistent HT is unknown. In subjects with WCHT it is unclear whether sustained or masked HT develops over time and exhibits an increased cardiovascular risk. In a previously performed 7.4-year follow-up study, there was no evidence that WCHT exhibited a clearly higher risk for the development cardiovascular events (4). In another study, complication risks of WCHT were not found as different from risks of subjects with sustained normal BP (5). Additionally, it remains unclear whether or not WCHT is associated with vascular organ damage (e.g., carotid arteriosclerosis). For instance, intima-media thickness and cross-sectional area of the carotid artery were found to be similar in patients with WCHT and sustained HT, and significantly higher than normotensives and the authors concluded that there is target organ damage in WCHT and WCHT should not be considered as an innocent trait (6).

According to our experience, there are many patients using antihypertensive medication, which has been initiated just after a single office measurement, but actually being normotensive, and in contrast, there are many patients not using any antihypertensive drug because of the normally measured BP at doctor’s office, but actually they are hypertensive and even some sequelas of HT have already developed in society. Therefore, here we have tried to understand the real prevalences and significances of WCHT and MHT.

### Materials and Methods

We randomly took 438 consecutive patients (223 females and 215 males), referring to the Internal Medicine Polyclinic of the Dumlupinar University for any complaint without excluding any disorder or medication. They were subdivided according to their age in decades. Clinical BP was measured in all cases by the same physician, and a 24-hour ambulatory BP measurement (ABPM) and 10-day twice daily HBPM were obtained in all cases, after a 10 minute education about the proper BP measurement techniques. The education included recommendation for use of upper arm devices, while discouraging wrist and finger devices, using a standard adult cuff with sizes of 12×26 cm for arm circumferences up to 33 cm and a large adult cuff with sizes of 12×40 cm for arm circumferences up to 50 cm in length, and taking a rest at least for a period of 5 minutes in the sitting position before measurement. WCHT (office BP of ≥ 140/90 mmHg, either for systolic or diastolic or for both, but home BP of <135/85 mmHg for both), sustained HT (home BP ≥135/85 mmHg, either for systolic or diastolic or for both), sustained normotension (NT) (home BP <135/85 mmHg and office BP <140/90 mmHg for both), and masked HT (office BP of <140/90 mmHg for both but home BP of ≥135/85 mmHg, either for systolic or diastolic or for both) were defined. WC effect is defined as the difference between mean office and home BP measurements. Comparison of proportions was used as the method of statistical analysis.

### Results

Among all of the randomly selected 438 consecutive patients, 190 cases with WCHT, 170 cases with sustained NT, 68 cases with sustained HT, and 10 cases with MHT were detected via HBPM. Results of ABPM only saw statistically insignificant decreases in the number of WCHT cases, decreased to 45.1% in third, 48.0% in fifth, and 47.3% in the fifth decades of life (p>0.05). Although the prevalences of sustained HT and MHT increased by decades, the prevalence of WCHT increased until the fourth decade and then began to decrease. The prevalence of all HT cases reached as high as 75.0% in the eighth decade. The highest prevalences of WCHT were observed during the third, fourth, and fifth decades as shown in Table 1. As an important observation, until the sixth decade of life, the prevalence of WCHT was much higher than all HT cases, including MHT cases. Even in the second decade, the prevalence of WCHT was 33% and in the third, fourth, and fifth decades higher than 45%. WC effect on diastolic BP alone was observed in 64.2% of WCHT cases (Table 2). Although 60.0% of WCHT cases were male, 65.3% of all HT cases were female (Table 3), which may also indicate different etiopathogenesis of WCHT from HT. Whereas no sexual difference was noted for MHT. Additionally, we could not find any differ-
Discussion

WCHT is a condition characterized by elevated BP in medical settings combined with normal ABPM or HBPMs. However, it is unknown whether it induces target organ damage or represents a transient state in development of HT. It was reported in the Ohasama study that WCHT is a risk factor for the development of home HT (2). Again, in an 8-year follow-up study, 60 subjects (46.9%) with WCHT and 144 (22.2%) cases with sustained NT progressed to home HT (7). The results demonstrate that WCHT is a transitional state to HT. But here, we observed very high prevalences of WCHT in our study cases, 33% in second, 46% in third, 50% in fourth, 48% in fifth, 36% in sixth, 19% in seventh, and 8% in the eighth decades of life. On the other hand, the prevalences of HT initially started to be higher than 40% during the sixth decade of life and it reached up to 75% prevalence in the eighth decade of life. The prevalences of HT were detected only as 3% in third, 8% in fourth, and 21% in the fifth decades. So it can be thought as a hypothesis that all of the hypertensives, 75% in the eighth decade, may arise from the previously WCHT cases, but this process takes a very long period of time, reaching up to the normal life span of a human being.

In another study, prevalences of WCHT and MHT increased with age (8). Here, we observed an increase prevalence of MHT by aging, too, but the prevalence of WCHT increased until the fourth decade and then began to decrease, and was lowered to 8% in the eighth decade, whereas it was higher than 40% in the third, fourth, and fifth decades of life. We detected the prevalence of MHT at lower than 5% until the seventh decade of life and it was 7% in seventh and 16% in the eighth decades. Its rate never exceeded 25% in all hypertensive cases. As an opposite finding to us, MHT was detected as common as WCHT and masking was correlated with male sex and young age, thus suggesting a causal relationship with greater daytime physical activity (9). Whereas according to our results, WCHT was a much frequently seen phenomenon than MHT until the eighth decade and MHT was dominantly detected in the elderly. Again our MHT cases showed an equal sexual distribution. As a parallel finding to us, the prevalence of WCHT was found to be 5% between the ages of 65 and 70 years in another study (10). But in the same study, the WC effect was found to be more marked for systolic than diastolic BP and the study was concluded as previously observed higher BPs seen in the very elderly may be explained by the greater WC effect. Whereas in 190 WCHT cases here, diastolic WC effect was observed in 122 (64%), both diastolic and systolic in 64 (33%), and systolic WC effect alone in four (2%) cases.

Recent HT guidelines propose use of self-measurement of BP at home as an important means to evaluate the response to antihypertensive treatment, to improve compliance with therapy, and most importantly, as an alternative to ABPM to confirm or refute the WCHT (11). Additionally, elderly persons tend to have an abnormal circadian rhythm. HBPMs are also useful to determine such a pathophysiological condition. HBPM is useful not only for diagnosis of HT but also for its management; i.e. choice and titration of antihypertensive drugs. A minimal antihypertensive effect and duration of action of antihypertensives can be determined by
HBPMs: the latter is established by the comparison of the antihypertensive effect of drug in the morning with that in the evening, i.e. morning-evening ratio. Appropriateness of HBPM to guide antihypertensive treatment was only tested in one large-scale randomized trial: the THOP (Treatment of Hypertension Based on Home or Office Blood Pressure) trial, in which it was shown that antihypertensive treatments based on home instead of office BP led to a less intensive drug treatment, but also to less BP control with no differences in general well being and left ventricular mass (12). In another study, both ABP and HBPMs appeared to be appropriate methods for detection of MHT (13). Additionally, HBPMs can provide a greater number of readings and, when automatic devices are used, an absence of observer bias. It may also increase compliance with antihypertensive therapy and reduce the number of visits required for diagnosis and treatment of HT. Patients can use this method several times by themselves in a year without requiring any ambulatory device. It is also a less expensive method of BP monitoring. Furthermore, self-measurement can also reveal therapeutic effects more reliably and has a greater predictive value for organic damage. Patients who measure their own BP should first receive comprehensive instruction for the technique. Experts recommend immediate recordings of measurements and use of upper arm devices while discouraging wrist and finger devices (1). As for the office and HBPMs, cuffs of appropriate size should be used; devices having a standard adult cuff with sizes of 12×26 cm for arm circumferences up to 33 cm and a large adult cuff with sizes of 12×40 cm for arm circumferences up to 50 cm in length (1). Patients should take a rest at least for a period of 5 minutes in the sitting position before starting measurement.

As a conclusion, HBPM should be the preferred method of diagnosis of WCHT, MHT, and sustained HT against conventional BPM at the doctor’s office and even ABPM due to its simplicity and effectiveness and it should be applied to every patient above the age of 40 years once a year due to the high prevalences of sustained and masked HT cases from this year of age. Additionally, due to the very high prevalences of WCHT even in early decades and sexual distribution differences between WCHT and all HT cases, WCHT should be thought as a normal response of the body against various stresses and its management should be limited to an annual follow-up with HBPMs.

References


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