Editorial Comment

Home or ambulatory blood pressure monitoring for the diagnosis of hypertension?

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In this issue of the \textit{Journal of Hypertension}, Kang \textit{et al.} \textsuperscript{[5]} provide further evidence in this regard, by reporting on the results of a cross-sectional study including data from 1774 patients in China, aimed at comparing the diagnostic accuracy of HBP with that of 24-h ABP monitoring. The results of this study are largely in line with the findings of the above-mentioned previous articles. Moreover, in these previous studies \textsuperscript{[3,4]}, there was moderate-to-substantial diagnostic agreement between the two methods ($\kappa$-statistic 0.40–0.70) \textsuperscript{[6]}, a finding that is confirmed by the data by Kang \textit{et al.} \textsuperscript{[5]} who reported $\kappa$-statistic values 0.40–0.66 in untreated and 0.41–0.58 in treated patients when comparing the diagnostic agreement between HBP and ABP monitoring.

Although rather confirmatory of previous papers, the study by Kang \textit{et al.} \textsuperscript{[5]} has several points of strength. First, analyses were performed on a large sample of individuals. Second, both treated and untreated individuals were included. Third, assessments of white-coat, masked and sustained hypertension were included in a single analysis. Fourth, 24 h rather than daytime ABP values were chosen to be taken as reference BP level, which means that night-time ABP was not ignored, in line with recent ESH ABP monitoring guidelines \textsuperscript{[7,8]}. Indeed, the prevalence of masked hypertension was always significantly larger when this condition was assessed by 24-h ABP monitoring, regardless of the antihypertensive treatment status. Fifth, HBP monitoring was implemented according to the recommended schedule by ESH guidelines \textsuperscript{[1]}, with 7-day monitoring and duplicate morning and evening measurements. Sixth, assessment of HBP was based on readings exported by the device memory, which thus prevented misreporting; and seventh, implementation and conduction of this study was done in China where there are scarce data comparing HBP with ABP.

Overall, the findings by Kang \textit{et al.} \textsuperscript{[5]} strengthen the importance of current recommendations indicating that presence of masked hypertension should be evaluated by taking into account a whole 24-h monitoring period and not only limiting the assessment to the awake period \textsuperscript{[7,8]}. Somehow surprisingly, however, authors did not find an association between masked hypertension and advanced age, diabetes mellitus, and, more in general, major cardiovascular risk factors, a finding which is in contrast with other population studies \textsuperscript{[9–11]}. 

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Probably, this is related to the fact that cardiovascular risk level was only low to moderate in this study, and the mean age of the population was younger than in the previous articles. An additional explanation of such finding might be that Chinese hypertensive patients may behave differently from Caucasian individuals, and thus cross comparison of data collected in different ethnic groups worldwide could be useful to identify possible differences.

The findings on the diagnostic agreement between HBP and ABP monitoring data in the study by Kang et al. [5] are supported by the results of a similar European study, which found a good agreement between HBP and ABP [12]. In fact, in this article, Nasothimiou et al. [12] also separately analyzed untreated and treated patients and focused on the assessment of white-coat, masked, and sustained hypertension, by investigating in a large dataset the diagnostic ability of HBP versus ABP [12]. Comparison of the two studies in Table 1 shows a striking similarity in the results with a high degree of diagnostic agreement between the two methods, ranging from 80 to 90% across all the hypertension phenotypes in both untreated and treated individuals.

The occurrence of some degree of diagnostic disagreement between HBP and ABP is not an unexpected finding, and should be interpreted by taking into account a few important factors. First, the reproducibility of both HBP and ABP, although being clearly superior to that of office BP, is still imperfect, which means that some level of diagnostic disagreement would be expected even when the same BP monitoring method (HBP or ABP) is applied twice [13]. Thus, on such a background, the level of agreement between the two methods observed in the study by Kang et al. [5] as well as in the previous studies [3,4] might be regarded as excellent. Second, any diagnostic disagreement between HBP and ABP does not necessarily mean that ABP is the correct method and HBP is wrong. In fact, a level of disagreement should be expected because, although the two methods have important similarities (given that they both provide multiple measurements in the usual environment of each individual), they also have important differences. ABP is usually monitored only once, although over 24 h and in fully ambulatory conditions, at work, at home, and during sleep, whereas HBP is monitored over several days, weeks, or months, but always in the same environment and posture (seated after a few minutes of rest, at home). Third, because of the above-mentioned methodological differences, HBP and ABP monitoring appear to have a complementary rather than a competitive role in the evaluation of hypertension and provide similar but also different information about the BP profile and behavior. These data are supported by a study in 2051 patients assessed with HBP and ABP monitoring in Italy, which compared white-coat hypertensive patients who had normal HBP and ABP values with those who showed normal values only with one of these out-office BP monitoring methods, and showed that the latter group had higher risk of cardiovascular event and death [14].

An additional and important difference between data obtained in the study by Kang et al. [5] and data obtained in the previous studies is that in both untreated and treated patients of the study by Kang et al. [5], average diastolic HBP was at similar levels with average 24-h diastolic ABP, whereas systolic HBP was by 4–5 mmHg higher than 24-h systolic ABP.

The study by Kang et al. [5] represents one of the first large studies assessing the respective diagnostic values of HBP versus ABP in the detection of white-coat and masked hypertension, in either untreated or treated hypertensive patients. This observational study, based on data collected in a large sample of Chinese hypertensive patients referring to hypertension clinics, yields several relevant new pieces of information on the features of white-coat and masked hypertension as assessed by these BP measuring methods. The low sensitivity and high specificity of home BP suggest that this technique may be useful to exclude a diagnosis of masked or white-coat hypertension but not to confirm its presence. This means that, in terms of hypertension management, ABP monitoring stands as the ideal tool to assess BP control, whereas HBP appears to be a complementary technique [1]. As a matter of fact, although ABP allows repeated measurements to be obtained both during awake activities and night sleep, this is not usually the case for HBP. On the contrary, at variance from 24-h ABP monitoring, self-BP measurements at home are collected over successive days, weeks, or months, which makes HBP monitoring a useful approach to BP assessment during long-term follow-up. With HBP monitoring, however, measurements are usually taken only during waking hours, without any possibility to have information also on nighttime BP levels. Thus, on the background of the growing awareness on the importance of night-time BP, in the future, the power of HBP for detecting masked or white-coat hypertension should be tested by considering the inclusion of sleep readings. This possibility is currently provided by new devices for HBP monitoring that allow a number of night-time automated HBP measurements to be obtained. Use of these novel diagnostic tools may thus

### TABLE 1. Diagnostic agreement between home and ambulatory blood pressure monitoring in two studies that assessed all hypertension phenotypes separately in untreated and treated patients

<table>
<thead>
<tr>
<th>Hypertension phenotype</th>
<th>Drug treatment</th>
<th>Nasothimiou et al. [12]</th>
<th>Kang et al. [5]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Agreement (%)</td>
<td>Kappa statistic</td>
</tr>
<tr>
<td>White coat</td>
<td>No</td>
<td>252 88</td>
<td>44*</td>
</tr>
<tr>
<td>White coat</td>
<td>Yes</td>
<td>361 92</td>
<td>69*</td>
</tr>
<tr>
<td>Masked</td>
<td>No</td>
<td>252 94</td>
<td>40*</td>
</tr>
<tr>
<td>Masked</td>
<td>Yes</td>
<td>361 79</td>
<td>69*</td>
</tr>
<tr>
<td>Sustained</td>
<td>No</td>
<td>252 88</td>
<td>73*</td>
</tr>
<tr>
<td>Sustained</td>
<td>Yes</td>
<td>361 92</td>
<td>80*</td>
</tr>
</tbody>
</table>

*P < 0.001.
allow to more precisely check the predictive value of HBP vis-à-vis that of ABP, under more similar settings.

In conclusion, the study by Kang et al. [5], together with the previous studies assessing the diagnostic ability of HBP monitoring, support the position of the ESH [1] that recommended the wide application of the method as a reliable alternative to ABP monitoring for the detection of the white-coat and masked hypertension phenomena and the confirmation of sustained hypertension both in the initial evaluation of untreated hypertension and also in the long-term follow-up, when assessing the occurrence of an effective BP control.

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Conflicts of interest
There are no conflicts of interest.

REFERENCES