Body Mass Index and Ambulatory Blood Pressure Monitoring

To the Editor:

Kotsis et al evaluated the relationship between body mass index and various ambulatory blood pressure parameters in referred untreated subjects (Hypertension, April 2005 issue). They reported increased incidence of white-coat hypertension and nondipping pattern among obese subjects. We believe these findings were produced by a flawed analysis of the data.

Although white coat hypertension was not defined in the article, we assume it conformed to an accepted definition, namely clinic hypertension accompanied by normal awake daytime ambulatory pressure. Thus, Kotsis et al reportedly found a greater incidence of normal awake ambulatory blood pressure among obese clinic hypertensive subjects than among their normal-weighing counter-subjects. However, a brief inspection of the 24-hour blood pressure diagrams accompanying the text reveals a late-afternoon blood pressure decline. This dip is associated with the siesta, a known and common phenomenon among Greek (as well as other) populations. In fact, in the two 24-hour ambulatory blood pressure studies from Greece that reported the siesta, it was practiced by not more than 75% of the participants, and the blood pressure diagrams in the study of Kotsis et al are consistent with such a rate. In view of the fact that the authors have not excluded measurements taken during afternoon naps from awake daytime averages as recommended in such populations, many subjects had their lower daytime sleep blood pressure averaged with their high daytime awake blood pressure, and subsequently some were misclassified as awake normotensive subjects. Because obese subjects were found to have higher ambulatory blood pressure, the effect of such misclassification is expected to be more pronounced in this subgroup. Thus we are lead to an erroneous impression that white coat hypertension is more common among the obese.

A similar inclusion of daytime sleep in a falsely low daytime average artificially reduces nocturnal blood pressure decline, leading to the reportedly higher rate of nondipping pattern that Kotsis et al found among obese patients.

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Response: White Coat Hypertension, Dipping, and Nondipping in Obesity

We reported that obese subjects have greater confirmed ambulatory blood pressure hypertension, white coat hypertension, and nondipping status compared with normal-weight subjects. Although differences in sleep pattern between obese and normal-weight subjects could in part explain blood pressure differences between obese and normal-weight subjects, it is unlikely that they would affect our conclusions.

Ben-Dov et al suggest that the effect of sleep on daytime blood pressure in obese subjects might be greater than in normal-weight subjects. They suggest that daytime ambulatory blood pressure in obese subjects is lower than their “awake” daytime blood pressure because of daytime naps. This explanation is unlikely because several previous studies indicate that obese patients frequently exhibit sleep apnea, and during sleep the usual decline in blood pressure observed in normal-weight subjects is blunted. Sleep apnea syndrome may also explain why our obese patients exhibited a nondipping pattern.

Daytime naps are unlikely to explain the decline in blood pressure that occurs in our patients during the early afternoon hours. It seems more likely that after the morning activity and stress, these people reduce their physical activity and relax in the afternoon. The mean average decline in blood pressure during afternoon hours is only approximately half of the decline that occurs during nighttime sleep (see Figure of the original article). As it has been reported before, blood pressure during napping declines at the same extent as during nighttime sleep.

In the current study, we have corrected for differences in sleep habits. As indicated in our Methods section, our patients were instructed to rest or sleep between 10:00 PM and 6:00 AM. Patients who were not compliant with these instructions were excluded from further analysis. Ambulatory blood pressure monitoring was also performed during a working day, and the majority of our patients are working individuals. It would be very difficult for them to take a nap during working days. Furthermore, these patients had appointments at the hypertension center between 1:00 PM and 3:00 PM. During these hours, the figure show a decline in blood pressure, and these patients were not at home taking a nap.

White coat hypertension can be defined either by using 24-hour blood pressure values or by using daytime blood pressure values. In the current study, we used the definition of white coat hypertension according to the 2003 European Society of Hypertension guidelines (Table 5, page 1017): office blood pressure \( \geq 140/90 \) mm Hg with 24-hour ambulatory blood pressure \( < 125/80 \) mm Hg. Average 24-hour blood pressure has been taken into account for the definition of white coat hypertension and not daytime blood pressure. For all these reasons, their speculation that siesta is lowering daytime blood pressure and that this results in an overestimation of white coat hypertension in obese subjects is incorrect. Finally, previous studies also report that white coat hypertension is common in obese patients.

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