

Prognostic value of nondipping: Are there ethnic differences?

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There is a normal circadian blood pressure (BP) variation characterized by higher levels during daytime and a 10%-20% decrease during sleep.¹ Subjects with this physiological BP fall during nighttime are defined as dippers. However, not all individuals show the same nighttime BP behavior. In 1988, O'Brien et al² reported for the first time a subgroup of hypertensive patients with a blunted nocturnal BP fall who also had a higher prevalence of stroke and named them as nondippers. Later, in addition to dippers and nondippers, patients with more detailed nocturnal BP patterns such as reverse dippers and extreme dippers have also been described.³ Characteristics⁴ of these patterns have been studied, and it has also been reported that prevalence of nondippers may be different according to ethnicity.⁵ Various studies have assessed the prognostic value of nighttime BP patterns both in hypertensive patients and in general populations.⁶⁻¹⁴ Though results were not always consistent across individual studies, probably because of differences in definitions, study populations, sample sizes, adjusted factor used, and end points,⁶⁻¹⁴ meta-analyses^{8,11,13} suggest that nondippers and reverse dippers are at increased cardiovascular risk when compared to dippers. Previous meta-analyses and international databases mainly included Caucasian and Japanese subjects with a lower proportion of other ethnicities (Table 1).^{8,11,13,14} As far as Chinese subjects were concerned, a small population was included in two studies.^{8,14} In any case, the cardiovascular outcome in nondippers according to ethnicity has not been specifically studied both in hypertensive patients and in general populations.

In this issue of the *Journal of Clinical Hypertension*, Lo et al¹⁵ assessed the prognostic value of nighttime BP patterns in a Chinese population. A total of 1199 Chinese patients with hypertension undergoing ambulatory BP monitoring were studied. Patients were followed up for a mean period of 6.42 years, and cardiovascular morbidity and mortality and all-cause mortality were recorded. There were 163 events during the follow-up. Normal dipping was observed

in 446 patients (37.2%), nondipping in 490 (40.9%), reverse dipping in 161 (13.4%), and extreme dipping in 102 (8.5%). Kaplan-Meier analyses showed lower survival in nondippers and reverse dippers for total cardiovascular events and coronary events but not cerebrovascular events. After adjustment for confounders, compared to dippers, in global nondippers and reverse dippers evaluated separately, the hazard ratio for total cardiovascular events was 1.17 (95% confidence interval, 0.77-1.76) and 1.17 (95% confidence interval, 0.68-2.02), respectively, and the hazard ratio for coronary events was 1.32 (95% confidence interval, 0.81-2.14) and 1.48 (95% confidence interval, 0.78-2.78), respectively. Thus, in this population nondippers and reverse dippers were at increased risk of total cardiovascular events and coronary events, when compared to dippers, but not significantly. Cerebrovascular events did not differ across various nighttime BP patterns. Globally, the findings of the present study¹⁵ are substantially in contrast with previous meta-analyses.^{8,11,13} We try to explain these discrepancies. 1) Included patients were those referred for suspected white coat hypertension, hypertension with white coat component, or refractory hypertension, and subjects with obstructive sleep apnea, in whom nondipping tends to be more frequent, were excluded. Thus, only patients with specific characteristics were enrolled. It is unclear whether this population may be completely representative of the entire hypertensive population and of the prevalence and prognostic value of nondipping. 2) BP readings were performed every 60 minutes during nighttime, in contrast to the majority of previous studies⁶⁻¹⁴ that used more frequent measurements. This aspect, together with possible artifacts, allows to obtain few BP readings potentially leading to a weaker information on nighttime BP and nighttime BP pattern. 3) Unusual cardiovascular end points were included such as cardiovascular-related hospitalization (cardiac arrhythmias, uncontrolled BP, stable and unstable angina) and new coronary heart disease /cerebrovascular disease (both clinical diagnosis or by investigations, without an acute event). The

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TABLE 1 Ethnic groups included in meta-analyses and international databases evaluating the prognostic value of nighttime blood pressure patterns

Study	Caucasian (%)	Japanese (%)	Uruguayan (%)	Brazilian (%)	Venezuelan (%)	Chinese (%)	Korean (%)	Other ^a (%)
Hansen et al ⁸ Hypertensive populations	81.9	11.1	...	2.3	...	...	...	4.7
Hansen et al ⁸ General populations	65.6	15.8	14.9	...	...	3.6	...	...
Salles et al ¹¹ Hypertensive populations	89.5	7.3	...	3.2	...	...	...	...
Cuspidi et al ¹³ Hypertensive populations	66.6	27.4	...	...	...	...	6.0	...
Yang et al ¹⁴ General populations	62.2	13.8	15.5	...	5.3	3.2	...	...

^aBlack, Hispanic, South Asian, Arabs.

abovementioned aspects could help explain discrepancies with previous studies.^{6,8-14} However, it cannot be excluded that differences may also be related to other factors, such as ethnicity. It has been reported that prevalence of nondippers may be different according to ethnicity.⁵ At present, we do not know whether the prognostic value of nondipping may be different in various ethnic groups. Future studies with similar recruitment criteria, methodological aspects, cardiovascular end points, statistical approach and of adequate power should be performed to investigate potential differences among ethnic groups. Thus, the jigsaw puzzle of the prognostic value of the nocturnal BP pattern has yet to be completed.

CONFLICT OF INTEREST

NONE

AUTHOR CONTRIBUTIONS

Sante D. Pierdomenico wrote the paper, revised the manuscript critically for important intellectual content, and gave final approval of the version to be submitted. Francesca Coccina revised the manuscript critically for important intellectual content and gave final approval of the version to be submitted.

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