

Hypertension

JOURNAL OF THE AMERICAN HEART ASSOCIATION



*Learn and Live*SM

Dipping Deeper Into the Ambulatory Arterial Stiffness Index

Ahmet Adiyaman, José Boggia, Yan Li, Ji-Guang Wang, Eoin O'Brien, Tom Richart,
Lutgarde Thijs and Jan A. Staessen

Hypertension 2007;50:e59-e60; originally published online Jul 16, 2007;

DOI: 10.1161/HYPERTENSIONAHA.107.094664

Hypertension is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX
72514

Copyright © 2007 American Heart Association. All rights reserved. Print ISSN: 0194-911X. Online
ISSN: 1524-4563

The online version of this article, along with updated information and services, is
located on the World Wide Web at:

<http://hyper.ahajournals.org/cgi/content/full/50/3/e59>

Subscriptions: Information about subscribing to *Hypertension* is online at
<http://hyper.ahajournals.org/subscriptions/>

Permissions: Permissions & Rights Desk, Lippincott Williams & Wilkins, a division of Wolters
Kluwer Health, 351 West Camden Street, Baltimore, MD 21202-2436. Phone: 410-528-4050. Fax:
410-528-8550. E-mail:
journalpermissions@lww.com

Reprints: Information about reprints can be found online at
<http://www.lww.com/reprints>

Letter to the Editor

Letters to the Editor will be published, if suitable, as space permits. They should not exceed 1000 words (typed, double-spaced) in length and may be subject to editing or abridgment.

Dipping Deeper Into the Ambulatory Arterial Stiffness Index

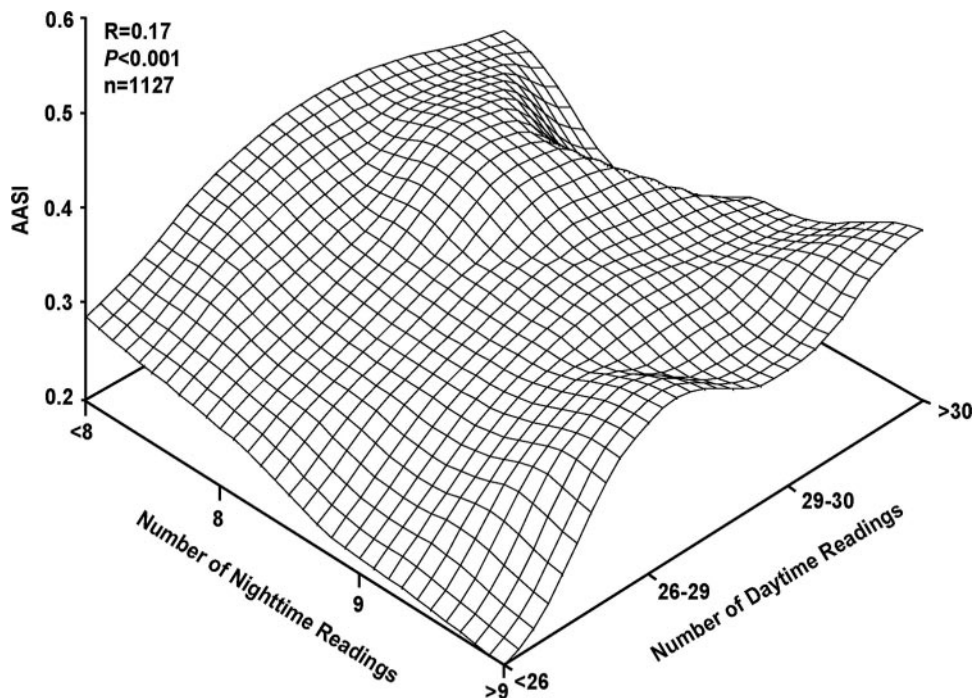
To the Editor:

Methodologic and conceptual issues seriously weaken the conclusions of Schillaci et al¹ on the ambulatory arterial stiffness index (AASI), as published in the May 2007 issue of *Hypertension*.

Schillaci et al¹ reported that, in 515 untreated patients, AASI depended on the nocturnal blood pressure fall. We confirmed this observation in our Flemish population study.² The correlation coefficients were similar to those in the report by Schillaci et al¹: -0.24 versus -0.28 for systolic blood pressure (2-sided P value computed by Fisher's Z transformation, 0.42), and -0.39 versus -0.46 for diastolic blood pressure ($P=0.11$). However, the ambulatory recording of 1 of the representative patients of Schillaci et al¹ included ≈ 25 nighttime and ≈ 35 daytime readings. The night:day ratio of the number of blood pressure readings was therefore 0.71 , whereas in our studies,^{2,3} it was ≈ 0.30 . As shown in the Figure, this ratio influences estimates of AASI. Furthermore, in our 166 Chinese volunteers,³ in whom we measured AASI and pulse wave velocity (PWV) within 24 hours, the correlation coefficients with the percentage fall in nocturnal blood pressure were similar for PWV and AASI (MTEST statement in the PROC REG procedure of the SAS package, version 9.1.3; $P>0.54$), amounting to -0.54 and -0.49 for systolic dipping and to -0.56 and -0.57 for diastolic dipping.

Schillaci et al¹ did not seek survival of AASI in the multivariate-adjusted association with left ventricular mass index. In Table 3 of their report,¹ they introduced not independent but highly inter-correlated predictors, bound to remove AASI from the model. The correlation between the daytime systolic pressure and the nocturnal fall in systolic blood pressure is close, because computation of the latter requires use of the former. Schillaci et al¹ did not report the t-to-enter for AASI and the variable, probably the daytime systolic blood pressure, that excluded AASI to remain in the model. More importantly, Schillaci et al¹ failed to demonstrate that, with similar adjustments applied as for AASI, the association between left ventricular mass index and PWV remained significant.

In line with our first report on AASI,³ Schillaci et al¹ found significant ($P<0.001$) association between PWV and AASI, although the correlation coefficient was lower (0.28 versus 0.51 ; $P=0.0039$). Schillaci et al¹ must be aware of Bland and Altman's⁴ recommendations for assessing concordance between 2 measurements and our analyses complying with these recommendations.⁵ Nevertheless, the Italian investigators did not go beyond reporting a correlation coefficient as measure of agreement. Moreover, it is conceptually wrong in the assessment of concordance between measurements to adjust for common determinants underlying the measured trait. In our Chinese volunteers,³ mean arterial pressure removed the association between PWV and AASI. That accounting for common determinants weakens the correlation between PWV and AASI actually corroborates that these 2 measurements reflect arterial stiffness.



Association of the AASI with the number of daytime and nighttime readings in 1127 subjects randomly recruited from a Flemish population.²

(*Hypertension*. 2007;50:e59-e60.)

© 2007 American Heart Association, Inc.

Hypertension is available at <http://hyper.ahajournals.org>

DOI: 10.1161/HYPERTENSIONAHA.107.094664

In conclusion, we confirmed that AASI is inversely correlated with the nocturnal fall in blood pressure, especially in ambulatory recordings with a disproportionately large number of nighttime readings. We concur with the idea that AASI is an indirect measure of arterial stiffness.^{3,5} However, we disagree with inappropriate or unnecessary adjustment in regression models,¹ and we regret that the information on the correlations of left ventricular mass index with AASI and PWV was incomplete.¹

Sources of Funding

The Fonds voor Wetenschappelijk Onderzoek Vlaanderen, Ministry of the Flemish Community (Brussels, Belgium; grants G.0424.03 and G.0575.06) and the University of Leuven (OT/00/25 and OT/05/49) supported the Flemish population study. The European Union (LSHM-CT-2006-037093 InGenious HyperCare) facilitated networking between the Shanghai Jiaotong University Medical School and the University of Leuven. The Nederlandse Hartstichting (Dr E. Dekker student grant), Den Haag, The Netherlands, supported the fellowship of A.A. in Leuven.

Disclosures

None.

Ahmet Adiyaman

*Nymegen Medical Centre
Department of General Internal Medicine
Radboud University
Nymegen, The Netherlands*

José Boggia

*Department of Pathophysiology
Universidad de la República*

Montevideo, Uruguay

Yan Li

Ji-Guang Wang

*Shanghai Institute of Hypertension
Shanghai Jiaotong University Medical School
Shanghai, China*

Eoin O'Brien

*Conway Institute of Biomolecular and Biomedical Research
University College
Dublin, Ireland*

Tom Richart

Lutgarde Thijs

Jan A. Staessen

*Department of Cardiovascular Diseases
University of Leuven
Leuven, Belgium*

- Schillaci G, Parati G, Pirro M, Pucci G, Mannarino MR, Sperandini L, Mannarino E. Ambulatory arterial stiffness index is not a specific marker of reduced arterial compliance. *Hypertension*. 2007;49:986–991.
- Staessen JA, Bieniaszewski L, O'Brien ET, Imai Y, Fagard R. An epidemiological approach to ambulatory blood pressure monitoring: the Belgian population study. *Blood Press Monit*. 1996;1:13–26.
- Li Y, Wang JG, Dolan E, Gao PJ, Guo HF, Nawrot T, Stanton AV, Zhu DL, O'Brien E, Staessen JA. Ambulatory arterial stiffness index derived from 24-hour ambulatory blood pressure monitoring. *Hypertension*. 2006;47:359–364.
- Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet*. 1986;2:307–310.
- Li Y, Dolan E, Wang JG, Thijs L, Staessen JA, O'Brien E, Stanton A. Ambulatory arterial stiffness index: determinants and outcome. *Blood Press Monit*. 2006;11:107–110.