

# Letter to the Editor

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## Determinants of the Ambulatory Arterial Stiffness Index Regression Line

To the Editor:

Ambulatory arterial stiffness index (AASI) has been proposed as an index of arterial stiffness that can be obtained from 24-hour blood pressure (BP) monitoring without the need for dedicated equipment and personnel.<sup>1</sup> A recent article by Adiyaman et al<sup>2</sup> extends our understanding of AASI by demonstrating that the fit of the regression line of diastolic on systolic BP in individual 24-hour BP recordings (expressed by the coefficient of determination, or  $r^2$ ) has an effect on the relation of AASI with its main clinical and demographic correlates. In a large database, the correlation coefficients of AASI with age, height, 24-hour mean arterial pressure, and 24-hour heart rate were stronger in the subjects with higher coefficients of determination. The authors suggest that AASI might be more meaningful in the subjects with a stronger relation between 24-hour diastolic and systolic BPs and suggest a limitation on future sensitivity analyses to the subjects with an  $r^2$  value of  $>0.36$ .

The question of whether the fit of the regression line of diastolic on systolic BP influences the clinical significance of AASI is of considerable clinical relevance.<sup>1</sup> However, in our view, a more basic question should also be addressed: why does the fit of the regression line vary among the different subjects? It has been observed<sup>3–5</sup> that the strength of the relation between diastolic and systolic BPs might depend in a substantial way on the degree of nocturnal diastolic BP reduction. In other words, subjects with a low coefficient of determination also tend to have a low nocturnal diastolic BP reduction. Of note, this relation is stronger with diastolic than with systolic BP reduction, because diastolic BP is the dependent variable in the regression model used to calculate AASI.

The suggestion by Adiyaman et al<sup>2</sup> to restrict in future sensitivity analyses the use of AASI to those subjects with a higher goodness of fit of the AASI regression line may improve the yield of AASI as a tool for risk stratification in hypertension but has 2 main limitations. First, it would exclude a large subgroup of subjects; second, more importantly, the excluded subjects will mostly have a reduced nocturnal diastolic BP fall (nondippers by diastolic BP). This, in a clinical study, would mean excluding from this interesting analysis those subjects potentially at higher risk. Excluding nondippers circumvents, but does not solve, the problem of the spurious association between AASI and nocturnal diastolic BP reduction.<sup>3</sup> The above association was confirmed by Adiyaman et al<sup>2</sup> in their large database, although it was not uniformly significant in each of the 4

quartiles of the  $r^2$  distribution. This should not come as a surprise, however, given that splitting the study population into quartiles of  $r^2$  reduces to a great extent the variability of nocturnal diastolic BP reduction, which is the strongest determinant of  $r^2$ .<sup>3–5</sup>

The modified AASI based on a symmetrical regression, as suggested by Gavish et al,<sup>4</sup> could be helpful in this regard, by providing an estimate of AASI, which is less affected by the nocturnal BP fall and by the goodness of fit of the regression slope.

## Disclosures

None.

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