Blood pressure variability: another puzzle piece

Variabilidade da pressão arterial: mais uma peça do quebra-cabeça

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Blood pressure is a biological variable that varies with time. A series of factors linked to daily activities and independent neurohormonal mechanisms cause blood pressure to vary significantly within the 24 hours of the day: it increases during physical activity and decreases considerably following acute exercise (post-exercise hypotension); it increases in conditions of physical or emotional distress and tends to decrease after meals and during sleep.[1]

Blood pressure variation throughout the sleep-wake cycle is well known, with lower values observed during nighttime sleep than in daytime wakefulness. The advent of non-invasive methods to measure blood pressure for 24 hours such as ambulatory blood pressure monitoring (ABPM) shed more light onto the behavior of blood pressure. Changes in blood pressure during sleep have also been associated with increased risk of cardiovascular and renal disease in the long term: it is the classical description of inadequate or absent drops in blood pressure during sleep seen in attenuated dippers and non-dippers, respectively, associated with left ventricular hypertrophy, hypertensive retinopathy, and proteinuria.[2]

A mathematical formula based on the different blood pressure levels observed in subperiods of the sleep-wake cycle was recently proposed to estimate the early morning rise in blood pressure. Pronounced rises in blood pressure during this time of the day ("*early morning surge*") have also been used to independently predict mean 24-hour, wake, and sleep blood pressure and the occurrence of cardiovascular events in the future.[3]

The paper by Garcia *et al.*,[4] published in this issue of the Brazilian Journal of Nephrology, looked into blood pressure variability in a group of 69 elderly individuals (age > 60 years) without diabetes or signs of postural hypotension on physical examination. Most of them (59 individuals) were taking medication for hypertension.

As indicated by the authors of the paper, blood pressure variability was greater among elderly individuals, either due to dysautonomia, altered baroreceptor reflex or arterial stiffness. The main goal of the study was to assess blood pressure variability in this population immediately after lunch, usually the main daily meal in Brazil (post-prandial period), and during sleep.

The enrolled patients were on ABPM for 24 hours, and measurements from three subperiods were compared: two hours before lunch, two hours after lunch, and during sleep. Significant dips in systolic (SBP) and diastolic blood pressure (DBP) were observed between the pre-prandial (125 ± 14/73 ± 13 mmHg) period and the post-prandial (113 ± 15/66 ± 11 mmHg - mean decrease of 10%) and sleep (108 ± 14/61 ± 11 mmHg - mean decrease of 14%) periods.

Although this finding was not necessarily new, since another paper by the same group had already shown dips in blood pressure after meals in groups of elderly individuals,[5] closer analysis of the data allowed the authors to positively and significantly associate the changes seen in SBP, DBP and

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mean blood pressure values in the post-prandial and sleep periods. Apparently, blood pressure variations of elderly individuals in the post-prandial period tend to behave similarly to blood pressure during sleep.

The paper cannot be used to define whether blood pressure changes in the post-prandial period might be useful in the stratification of hypertensive patients for cardiovascular risk, similarly to what is done with blood pressure variation in the sleep-wake cycle, but it offers a good starting point.

Therefore, the outcomes published in this paper make up a small piece that has come to help us solve the complex puzzle of blood pressure variability in humans.

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