

DIURNAL VARIATION OF CENTRAL AORTIC PRESSURE AND AORTIC-TO-BRACHIAL PULSE PRESSURE AMPLIFICATION IN HEMODIALYSIS PATIENTS

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Introduction: Unlike the general population, in the vast majority of hemodialysis patients, the phenomenon of nocturnal fall in brachial blood pressure (BP) is blunted and non-dipping BP pattern is associated with acceleration of target-organ damage and increased risk of mortality [1-3]. Whether central aortic BP and aortic-to-brachial BP amplification follow a similar diurnal variation with that of brachial BP was not previously investigated in the hemodialysis population. Accordingly, this study provides a comparative evaluation of the magnitude of nocturnal BP change in the ascending aorta and in the brachial artery in hemodialysis patients.

Materials and Methods: Aortic and brachial ambulatory BP monitoring was performed with the use of the Mobil-O-Graph device (IEM, Stolberg, Germany) during the dialysis-off day in 153 long-term hemodialysis patients. Mobil-O-Graph is a newly introduced brachial cuff-based automatic oscillometric device, which records brachial BP and pulse waveforms and assesses central BP via generalized transfer function [4]. Patients were classified as “dippers”, “non-dippers” or “reverse-dippers” based on night/day ratio of brachial systolic BP (SBP). Pulse pressure (PP) amplification was defined as the ratio of brachial to aortic PP.

Results: The baseline characteristics of study participants are depicted in Table 1. Study participants (89 men and 64 women) with a mean age of 63.0±13.4 years and were receiving dialysis for a mean period of 38.9±15.5 months. The prevalence of blunted circadian BP pattern was as high as 89.5%, with more than half of the patients (58.8%) classified as reverse-dippers. Day-to-night change in brachial SBP did not significantly differ from the relevant change in aortic SBP among patients classified as dippers (-20.3±5.9 vs -19.2±8.4 mmHg, P= 0.37) and non-dippers (-5.6±3.3 vs -5.3±3.4 mmHg, P= 0.71) (Figure 1). Among those classified as reverse dippers, day-to-night SBP increase was higher in the brachial artery level than in the ascending aorta (10.1±7.9 vs 8.6±7.8 mmHg, P<0.001). As shown in Figure 2, similarly to day-to-night BP variation, aortic-to-brachial PP amplification was no different between day-time and night-time periods in all 3 dipping-status categories (dippers: 1.33±0.1 vs 1.31±0.1, P= 0.56; non-dippers: 1.36±0.1 vs 1.34±0.2, P= 0.44; reverse-dippers: 1.31±0.1 vs 1.29±0.2, P= 0.46).

Conclusion: This study shows that the blunted circadian BP pattern affects up to 90% of hemodialysis patients. Central aortic BP follows a similar circadian pattern with that of brachial BP. Prospective studies are warranted to elucidate whether the diurnal variation of central hemodynamic indices has prognostic implications in hemodialysis patients.

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Table 1: Baseline demographic, clinical and routine biochemical characteristics of study participants

N	153
Sex (male/female)	89/64
Age (years)	63.0 ± 13.4
Dry weight (kg)	73.4 ± 14.8
BMI (kg/m ²)	26.6 ± 7.7
Hb (g/dl)	11.3 ± 1.3
Glucose (mg/dl)	121.0 ± 61.0
Urea (mg/dl)	138.0 ± 36.0
Creatinine (mg/dl)	8.2 ± 0.5
Potassium (mmol/l)	4.9 ± 0.7
Sodium (mmol/l)	137.9 ± 3.6
Calcium (mg/dl)	8.9 ± 0.7
Phosphate (mg/dl)	5.1 ± 1.5

Figure 1: Day-to-night change in brachial vs aortic systolic BP according to the dipping status in long-term hemodialysis patients

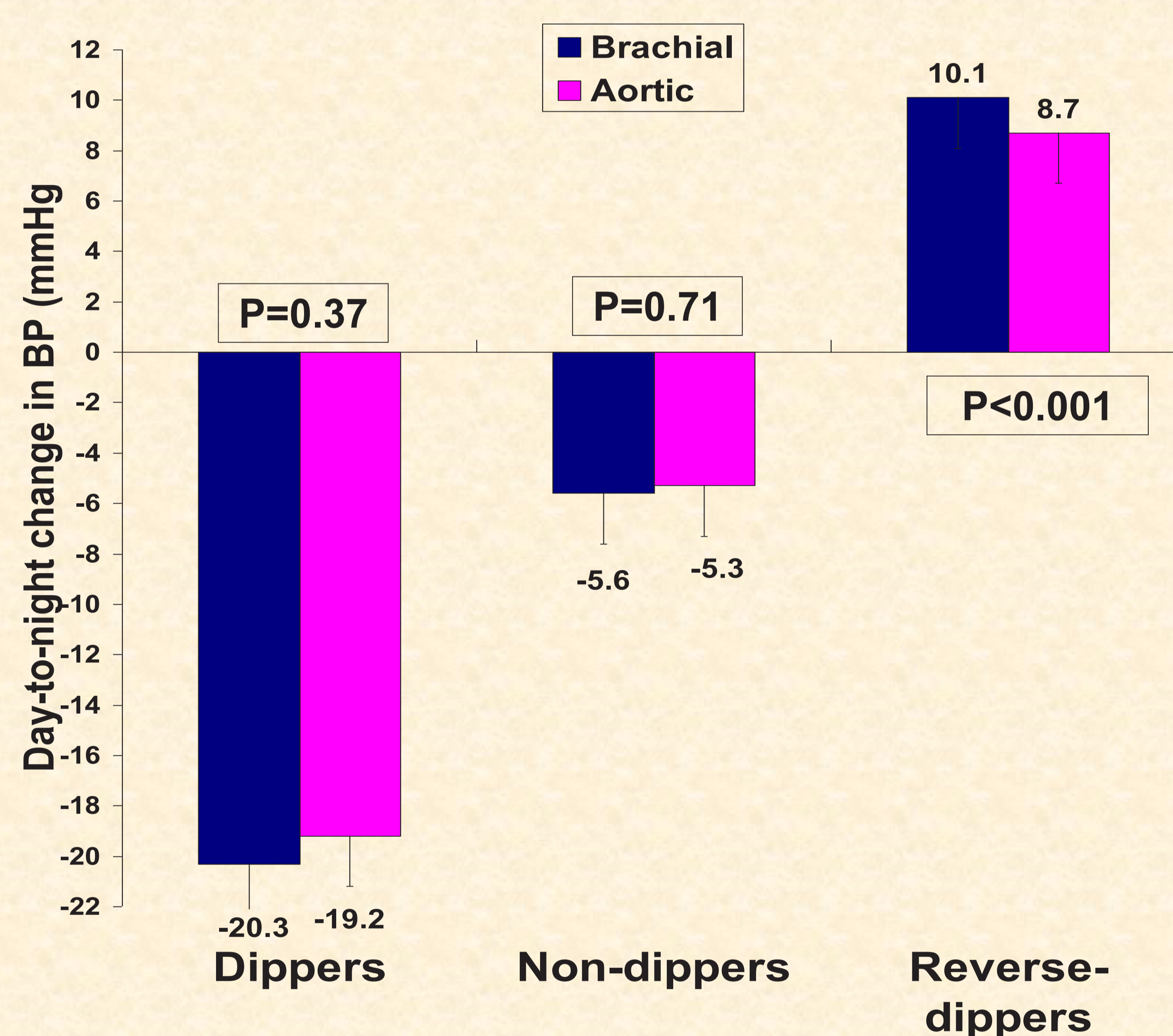


Figure 2: Aortic-to-brachial PP amplification during day-time and night-time periods according to the dipping status in long-term hemodialysis patients

