SHORT TERM VARIABILITY OF AMBULATORY BLOOD PRESSURE DOES NOT PREDICT CARDIOVASCULAR OUTCOME IN NON-DIALYSIS CKD PATIENTS

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INTRODUCTION

- Ambulatory blood pressure monitoring (ABPM) is considered the gold standard for assessment of hypertension burden in non-dialysis chronic kidney disease (ND-CKD) because of closer correlation with cardiac organ damage and better prediction of adverse outcome than office BP [1].
- In essential hypertension, day-by-day ABPM variability (ABPV) has been recently demonstrated to further improving cardiovascular (CV) risk stratification [2,3]; however, whether this holds true also in patients with CKD remains unknown.
- **This multicenter prospective study was aimed at evaluating prognostic role of ABPM variability on CV outcome in ND-CKD.**

METHODS

ENROLLMENT PERIOD: Jan 2001 to Dec 2011

INCLUSION CRITERIA:
- Consecutive patients with diagnosis of CKD
- Regular nephrology care from ≥6 months
- Available ABPM (Spacelab 90207)

EXCLUSION CRITERIA:
- Acute kidney injury in the previous 3 mos
- Active malignancy
- Advanced liver disease
- atrial fibrillation;
- Steroid or immunosuppressive therapy
- inadequate ABPM (<20 and <7 day/night recordings).

ABP MONITORING

ABPM was obtained on a workday and under regular antihypertensive treatment. ABP frequency was every 15 minutes from 7:00 AM to 11:00 PM and every 30 minutes from 11:00 PM to 7:00 AM. Daytime and nighttime periods were derived from the patient's diary

ABPV EVALUATION:

ABPV was the weighted standard deviation (SD) of 24-hour systolic blood pressure (SBP) (WSD 24hSBP), calculated according to the following formula (4):

$$[(Sd_{daytime} \times hrs_{daytime}) + (SD_{daytime} \times hrs_{daytime})]/24$$

COMPOSITE ENDPOINT:CV deaths and non fatal events (myocardial infarction, stroke, congestive heart failure, cardiac or peripheral revascularization, non-thraumatic amputations)

RESULTS

TABLE 1. *Clinical characteristics of the 444 patients enrolled.*

DEMOGRAPHIC AND CLINICAL	
Age (years)	63.1±14.3
Males (%)	57.4
BMI (kg/m^2)	29.1±5.3
Smoking (%)	25.7
Diabetes (%)	34.0
History of CVD (%)	28.6
CKD Stage 1-2 (%)	23.2
CKD Stage 3 (%)	49.3
CKD Stage 4 (%)	21.4
CKD Stage 5 (%)	6.1
GFR (mL/min/1.73m^2)	45.0±20.6
Proteinuria (g/day)	0.24 [0.08-0.92]
Hemoglobin (g/dL)	12.9±1.8
Total cholesterol (mg/dL)	189±37
BLOOD PRESSURE	
Office SBP/DBP (mmHg)	145±19/81±12
Office BP <140/90 mmHg (%)	32.2
24h SBP/DBP (mmHg)	126±16/72±10
24h BP <130/80 mmHg (%)	51.8
Daytime SBP/DBP (mmHg)	129±17/75±11
Daytime BP <135/85 mmHg (%)	56.8
Nighttime SBP/DBP (mmHg)	120±19/66±11
Nighttime BP <120/70 mmHg (%)	42.8
ANTIHYPERTENSIVE TREATMENT	
Number of drugs	2 [1-3]
RAS inhibitors (%)	79.7
Calcium channel blockers (%)	44.8
Beta-blockers (%)	35.6
Furosemide(%)	29.5

TABLE 2. *Linear regression analysis estimating factors associated with ABP variability.*

Variables	β Coefficient	P
Age (years)	0.061	**<0.001**
History of CVD (yes vs no)	0.604	**0.046**
Proteinuria (g/day)	-0.238	**0.017**
24h SBP (mmHg)	0.064	**<0.001**
Non-dipping status (yes vs no)	-0.870	**0.001**
Number of antihypertensives	0.367	**<0.001**

Model summary: R^2=0.362, P<0.001.

Model adjusted also for gender, BMI, smoking, diabetes, Hb, GFR, Office SBP

TABLE 3. *Cox regression analysis estimating the risk for CV event associated with ABP variability. Median follow-up: 4.8 years (IQR 2.4-7.6).*

	Unadjusted HR [95%CI]	**Model 1** HR [95%CI]	**Model 2** HR [95%CI]
CV Outcome (n=116)			
ABP Variability (5 mmHg)	**2.03 [1.58-2.60]**	1.18 [0.88-1.59]	1.06 [0.77-1.46]
24h SBP (5 mmHg)	**1.15 [1.09-1.21]**	**1.08 [1.01-1.15]**	**1.08 [1.01-1.15]**

Model 1 adjusted for age, gender, BMI, smoking, history of CV disease, diabetes, cholesterol, Hb, GFR, proteinuria, office SBP; Model 2 adjusted for model 1 variables + ABP variability and 24hSBP

Likelihood ratio test confirmed the greater predictive role of the 24hSBP; specifically, adding the 24hSBP to the WSD 24hSBP increased the model fit for the CV endpoint (P=0.033) while the model fit did not improve when the ABP variability was added to the 24h SBP (P=0.81).

CONCLUSIONS

This study provides evidence that 24h SBP is superior to day-by-day ABP variability (WSD 24hSBP) in predicting cardiovascular outcome in ND-CKD. The value of this finding grows when considering that 24h SBP is immediately accessible to clinical nephrologists.

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