COMPARISON OF CENTRAL AORTIC AND BRACHIAL BLOOD PRESSURE LEVELS DURING A 48-HOUR AMBULATORY RECORDING IN END-STAGE RENAL DISEASE PATIENTS UNDER HEMODIALYSIS

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BACKGROUND/AIMS: In clinical conditions characterized by accelerated arterial stiffening, peripheral blood pressure (BP) at the level of brachial artery can not accurately reflect BP in the ascending aorta, due to the aortic-to-brachial pressure amplification phenomenon [1,2]. Such a clinical condition is end-stage renal disease (ESRD), in which aortic BP was shown to be a better predictor of all-cause and cardiovascular mortality than brachial BP [3,4]. We investigated in comparison aortic and brachial BP levels during a 48-hour ambulatory BP monitoring (ABPM) in ESRD patients receiving hemodialysis.

MATERIAL AND METHODS: Aortic and brachial ABPM was performed with the use of the Mobil-O-Graph device (IEM, Stolberg, Germany) [5] for a 48-hour period including a hemodialysis session and the following interdialytic interval in 92 ESRD patients receiving maintenance hemodialysis treatment. 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 mathematical transformation (generalized transfer function). Statistical analysis was performed with the Statistical Package for Social Sciences (SPSS 17.0) for Windows XP. Comparison of BP measurements in the aorta and in brachial artery were performed with the independent samples Student's t-test.

RESULTS: Demographic and pre-dialysis biochemical parameters of study participants are presented in Table 1. As shown in Table 2 and Figure 1, mean ambulatory aortic systolic BP (SBP) and pulse pressure (PP) during the 48-hour recording period was significantly lower than ambulatory SBP and PP at the level of brachial artery (121.7±14.7 vs 133.1±16.6 mmHg, P<0.001 for SBP and 41.1±5.7 vs 54.5±8.9 mmHg, P<0.001 for PP respectively). In contrast, ambulatory 48-hour diastolic BP (DBP) was significantly higher in the ascending aorta than in brachial artery (80.2±10.4 vs 78.6±10.2 mmHg, P<0.001) (Table 2). These differences between aortic and brachial BP were evident for both day-time and night-time periods as well as during both the hemodialysis-on (Day 1) and hemodialysis-free days (Day 2) (Table 3).

CONCLUSIONS: This is the first study comparing 48-hour central and brachial BP in hemodialysis patients and shows about 12 mmHg lower ambulatory SBP and PP in the aorta than in brachial artery, consistent during the 48-hour period. Future studies are warranted in order to investigate any possible effects of this difference on cardiovascular risk.

Table 1: Baseline characteristics of study participants (m±SD)

N	92
Sex (male/female)	54/38
Age (years)	62.6 ± 15.1
Dry weight (kg)	72.2 ± 15.5
BMI (kg/m²)	25.9 ± 4.9
Hb (g/dl)	11.2 ± 1.3
Glucose (mg/dl)	121 ± 61
Urea (mg/dl)	138.3 ± 37.3
Creatinine (mg/dl)	8.3 ± 2.5
Potassium (mmol/l)	4.9 ± 0.7
Sodium (mmol/l)	137.9 ± 3.6
Calcium (mg/dl)	8.9 ± 0.7
Phosphate (mg/dl)	4.9 ± 1.4

Table 2. Comparison of SBP, DBP and PP between the ascending aorta and brachial artery during a 48-hour ABPM (m±SD).

48-hour Period			
Parameter	**Aortic**	**Brachial**	**P**
SBP (mmHg)	121.2 ± 14.7	133.1 ± 16.6	<0.001
DBP (mmHg)	80.2 ± 10.4	78.6 ± 10.2	<0.001
PP (mmHg)	41.1 ± 9.7	54.5 ± 12.9	<0.001
Day-time Period			
Parameter	**Aortic**	**Brachial**	**P**
SBP (mmHg)	121.4 ± 14.6	133.5 ± 16.4	<0.001
DBP (mmHg)	81.1 ± 10.6	79.5 ± 10.4	<0.001
PP (mmHg)	40.3 ± 9.9	54.0 ± 12.8	<0.001
Night-time Period			
Parameter	**Aortic**	**Brachial**	**P**
SBP (mmHg)	120.8 ± 17.1	132.0 ± 19.0	<0.001
DBP (mmHg)	77.5 ± 11.1	76.1 ± 10.9	<0.001
PP (mmHg)	43.3 ± 10.7	55.9 ± 13.9	<0.001

Figure 1. Mean 48-hour SBP, DBP and PP in the ascending aorta and in brachial artery.

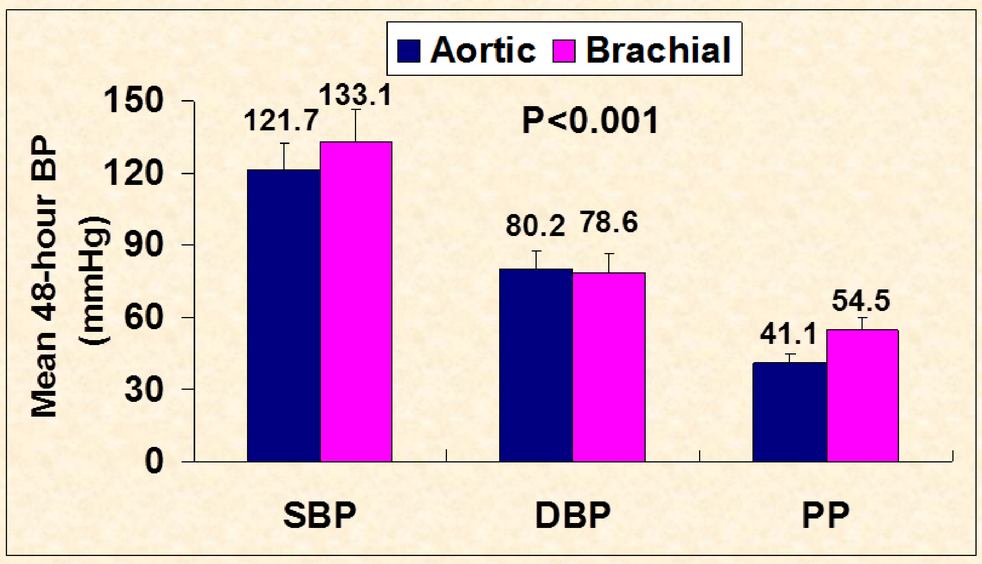

Table 3. Comparison of SBP, DBP and PP between the ascending aorta and brachial artery in the hemodialysis-on and hemodialysis-free days (m±SD).

	Hemodialysis day Day (1)			Hemodialysis-free day Day (2)		
	24-hour period					
Parameter	**Aortic**	**Brachial**	**P**	**Aortic**	**Brachial**	**P**
SBP (mmHg)	119,6±15,3	131,4±17,4	<0,001	123,1±15,1	134,9±17,0	<0,001
DBP (mmHg)	79,9±10,6	78,3±10,4	<0,001	80,5±10,8	79,0±10,6	<0,001
PP (mmHg)	39,7±10,0	53,2±13,1	<0,001	42,6±10,1	56,0±13,2	<0,001
Day-time period						
Parameter	**Aortic**	**Brachial**	**P**	**Aortic**	**Brachial**	**P**
SBP (mmHg)	119,9±15,1	132,0±17,0	<0,001	123,2±15,3	135,1±17,2	<0,001
DBP (mmHg)	81,1±10,6	79,4±10,4	<0,001	81,3±11,3	79,6±11,1	<0,001
PP (mmHg)	38,8±10,1	52,6±13,1	<0,001	41,9±10,3	55,513,2	<0,001
Night-time period						
Parameter	**Aortic**	**Brachial**	**P**	**Aortic**	**Brachial**	**P**
SBP (mmHg)	118,7±17,9	129,7±20,2	<0,001	123,3 ± 17,9	134,6±19,6	<0,001
DBP (mmHg)	76,5±12,2	75,0±12,0	<0,001	78,5 ± 11,2	77,2±11,0	<0,001
PP (mmHg)	42,2±11,1	54,8±14,4	<0,001	44,8 ±12,1	57,4±14,8	<0,001

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