

INCREASES IN BRACHIAL AND AORTIC BLOOD PRESSURE DURING THE EVENING OF THE 3RD DAY OF THE LONG INTERDIALYTIC INTERVAL OF HEMODIALYSIS PATIENTS

G. Koutroumpas¹, P.A. Sarafidis², P.I. Georgianos³, A. Karpetas³, A. Protogerou⁴, Ch. Syrganis¹, S. Panagoutsos⁵, P. Pasadakis⁵

1 Department of Nephrology, Achilopoulos General Hospital, Volos, Greece

2 Department of Nephrology, Hippokrateion University Hospital, Thessaloniki, Greece

3 Section of Nephrology and Hypertension, 1st Department of Medicine, AHEPA University Hospital, Thessaloniki, Greece

4 Hypertension Unit, "Laiko" Hospital, Medical School, National and Kapodistrian University of Athens, Greece

5 Division of Nephrology, Democritus University of Thrace, Alexandroupolis, Greece

Background:

Studying the ambulatory blood pressure (BP) pattern during the 72 hour interdialytic interval in thrice weekly hemodialysis patients, we found a continuous rise in BPs and aortic stiffness indices from day 1 to day 3. There was a characteristic increase in peripheral and aortic blood pressures during the evening of the 3rd day, between 18:00 and 22:00 hour. In order to find its magnitude and significance, we analyzed it separately and compare it to the whole 3rd day.

Methods and materials:

This was a study of 58 hemodialysis patients, with mean age 63.26±14.38 years and median time on dialysis 27.03 (3-135.5) months, who underwent ambulatory blood pressure monitoring during the whole 3 day and night interdialytic interval with the Mobil-O-Graph device (IEM, Stolberg, Germany). Mobil-O-Graph is a validated brachial cuff-based automatic oscillometric device that records brachial BP and pulse waveforms and calculates aortic BP and stiffness indices. Parameters of the 3rd day evening (between 18:00 and 22:00 hour) were compared with the whole 3rd day-time.

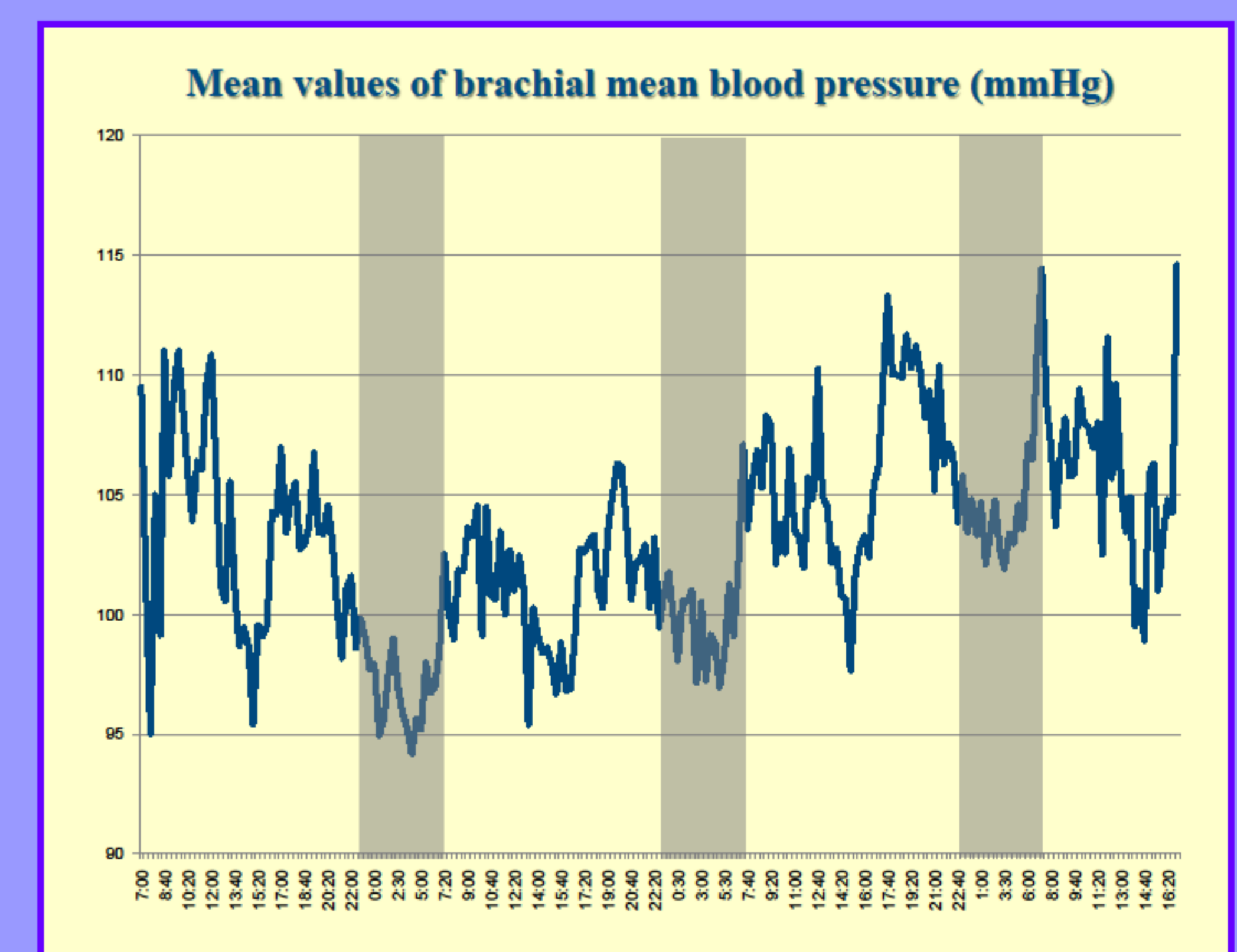


Results:

	18:00 - 22:00 3 rd Day	3 rd Daytime	Δ	p
Brachial systolic pressure (mmHg)	140.58±21.59	135.27±20.10	5.31	<0.001
Brachial diastolic pressure (mmHg)	83.91±12.77	80.83±11.55	3.07	<0.001
Brachial mean pressure (mmHg)	109.85±15.51	105.76±14.35	4.08	<0.001
Brachial pulse pressure (mmHg)	56.67±15.61	54.43±14.33	2.23	0.001
Heart rate /min	74.97±11.37	73.52±10.07	1.44	0.007
Aortic systolic pressure (mmHg)	128.93±18.12	123.73±16.69	5.20	<0.001
Aortic diastolic pressure (mmHg)	85.68±12.97	82.37±11.83	3.31	<0.001
Aortic pulse pressure (mmHg)	43.24±12.15	41.36±10.90	1.87	0.001
Aix75 (%)	29.15±8.49	28.04±7.38	1.11	0.077
Aix (%)	29.57±11.02	29.08±9.80	0.49	0.495
Augmentation pressure (mmHg)	14.44±8.31	13.52±7.23	0.92	0.034
PWV (m/sec)	9.77±2.35	9.60±2.34	0.17	<0.001

	18:00 - 22:00 3 rd Day	1 st Daytime	2 nd Daytime	Difference 3 rd evening - 1 st Daytime	p	Difference 3 rd evening - 2 nd Daytime	p
Brachial systolic pressure (mmHg)	140.58±21.59	130.12±22.77	129.70±20.01	10.46	<0.001	10.88	<0.001
Brachial diastolic pressure (mmHg)	83.91±12.77	78.20±12.89	77.10±12.24	5.71	<0.001	6.81	<0.001
Brachial mean pressure (mmHg)	109.85±15.51	101.99±16.11	101.19±14.71	7.85	<0.001	8.65	<0.001
Brachial pulse pressure (mmHg)	56.67±15.61	51.92±16.62	52.60±13.87	4.74	<0.001	4.07	<0.001
Heart rate /min	74.97±11.37	78.55±12.87	75.69±10.54	-3.58	0.002	-0.72	0.230
Aortic systolic pressure (mmHg)	128.93±18.12	117.60±19.24	118.38±16.87	11.32	<0.001	10.54	<0.001
Aortic diastolic pressure (mmHg)	85.68±12.97	80.06±12.95	78.78±12.28	5.61	<0.001	6.90	<0.001
Aortic pulse pressure (mmHg)	43.24±12.15	37.53±12.03	39.59±10.31	5.70	<0.001	3.64	<0.001
Aix75 (%)	29.15±8.49	26.07±8.65	27.55±6.52	3.08	0.018	1.59	0.124
Aix (%)	29.57±11.02	24.34±8.51	27.38±9.39	5.23	<0.001	2.19	0.059
Augmentation pressure (mmHg)	14.44±8.31	10.22±6.33	12.14±6.84	4.21	<0.001	2.30	0.002
PWV (m/sec)	9.77±2.35	9.39±2.35	9.41±2.31	0.37	<0.001	0.35	<0.001

Mean brachial systolic and diastolic BPs were 140.58±21.59 mmHg and 83.91±12.77 mmHg during the 3rd evening while they were 135.27±20.10mmHg and 80.83±11.55 mmHg during the 3rd day (Difference = 5.31 mmHg, p<0.001 and D=3.07 mmHg, p<0.001, respectively). Heart rate was 74.97±11.37/min during the 3rd evening and 73.52±10.07/min during the 3rd day (D=1.44/min, p=0.007). Mean aortic systolic and diastolic BPs were 128.93±18.12 mmHg and 85.68±12.97 mmHg during the 3rd evening while they were 123.73±16.69 mmHg and 82.37±11.83 mmHg during the 3rd day (D=5.20 mmHg, p<0.001 and D=3.31 mmHg, p<0.001, respectively). All pressure differences were even greater when compared with the 1st or 2nd day. Mean aortic Augmentation Index (adjusted for heart rate) was 29.15±8.49% during the 3rd evening and 28.04±7.38% during the 3rd day (D=1.11%, p=0.077). Mean pulse wave velocity was 9.77±2.35 m/sec during the 3rd evening and 9.60±2.34 m/sec during the 3rd day (D=0.17 m/sec, p<0.001). These findings led us to add hypertensive agents in 35 patients, in order to achieve a better control of their hypertension.



Conclusions:

There is a significant increase in brachial and aortic BPs and PWV during the evening of the 3rd day of the long interdialytic interval in thrice weekly hemodialysis patients. This weekly hypertension peak would be missed if we check hemodialysis patients with 44hour ambulatory blood pressure monitoring, as have been proposed, while additional clinical attention should be required.

