

Differences of clinical and vascular parameters between dippers and non-dippers in patients with maintenance hemodialysis

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ABSTRACT

Background: Cardiovascular disease is the leading cause of death in ESRD patients. The cardiovascular complications of non-dippers are known to be greater than the dippers in the stratification of hypertensive patients. Oxidative stress plays key roles in developing cardiovascular disease and non-dippers related with higher oxidative stress markers and lower antioxidant levels.

Methods: A total of 55 patients who were on maintenance hemodialysis were enrolled and 49 patients were analyzed. All the participants were performed 24-hour ambulatory blood pressure (ABP) monitoring to divide the patients into two groups; dippers and non-dippers. Non-dippers were defined by a nocturnal reduction in average daytime blood pressure of less than 10%. Bioimpedance analysis (BIA), ankle-brachial index (ABI), and carotid artery intima-media thickness (CA-IMT) were performed with routine laboratory tests for baseline study.

Results: Dippers and non-dippers were 11 and 38 patients, respectively. Age, body mass index, profiles of BIA, proportion of abnormal results in ABI, IMT and all the laboratory tests were not different between the two groups. The mean systolic BPs in daytime were not different between dippers and non-dippers (131 vs. 136 mmHg, $P=0.320$). However, the nocturnal mean systolic BPs were significantly different between the two groups (112 vs. 137 mmHg, $P<0.001$). Not only for systolic BP, nocturnal minimum, maximum, or mean diastolic BPs were significantly high in non-dippers than dippers. After 6, 9 months of study initiation, intact PTH levels of dippers were significantly higher than non-dippers ($P=0.013$ and $P=0.033$).

Conclusion: This study is still on-going and more data should be collected to evaluate major parameters such as oxidative stress markers, CA-IMT, BIA, ABI, and laboratory findings between the two groups.

BACKGROUND

◆ Cardiovascular disease (CVD) represents the leading cause of death in dialysis patients, accounting for up to 40% of deaths.

McDonald S, Excell L: ANZDATA Registry Report 2005 Annual Data Report. Minneapolis, MN, U.S. Renal Data Systems, 2006

◆ Non-dippers are at increased risk for cerebrovascular and cardiovascular complications than are individuals with a dippers.

Verdecchia P et al. Hypertension 1994;24:793-801
Kario K et al. Hypertension 2001;38:852-7

◆ The oxidative stress may play a crucial role in cardiovascular disease and antioxidant therapy may prove beneficial in these disease.

Dhalla NS, J Hypertens. 2000 Jun;18(6):655-73

PURPOSE

◆ To compare clinical parameters, vascular calcification and oxidative stress markers between dippers and non-dippers in patients with maintenance hemodialysis.

METHODS

Patients

- Of 55 patients who treated hemodialysis, 49 patients were enrolled and divided into two groups by results of ambulatory blood pressure ; dipper and non-dippers
- Laboratory test: every three months for two years.
- Institutions
 - ✓ Chung-Ang University Hospital
 - ✓ Sungae Hospital, Seoul, Korea

Definition

- Dipper group : BP values reveal 10–20% lower values in the night, compared to daytime measurements
- Non-dipper group : nighttime BP lowering does not occur or shows a decrease less than 10%

Effectiveness

- Primary : myeloperoxidase, hydroperoxide
- Secondary : ABI, IMT, BIA, laboratory test

RESULT

◆ Baseline characteristics

	Dipper (n=11)	Non-dipper (n=38)	Total (N=49)	P-value
Age (year)	69 [56, 81]	63 [41, 88]	66 [41, 88]	0.111
Patient sex (male, %)	7 (63.6)	21 (55.3)	28 (57.1)	0.621
BMI (kg/m ²)	23.7 [18.0, 25.8]	23.0 [17.3, 29.3]	23.1 [17.3, 29.3]	0.981
ECW/TBW	0.399 [0.383, 0.421]	0.403 [0.379, 0.434]	0.403 [0.379, 0.434]	0.388
IMT (>10mm)	6 (54.5%)	24 (64.9%)	30 (62.5%)	0.724
ABI (<0.8)	1 (9.1%)	3 (8.1%)	4 (8.3%)	0.918
Hemoglobin (g/dL)	10.2 [9.9, 15.5]	10.6 [8.3, 13.5]	10.4 [8.3, 15.5]	0.435
Protein (g/dL)	6.7 [5.7, 7.7]	6.5 [5.3, 7.4]	6.5 [5.3, 7.7]	0.421
Albumin (g/dL)	3.7 [3.4, 4.5]	3.9 [2.8, 4.6]	3.8 [2.8, 4.6]	0.819
Calcium (mg/dL)	9.0 [7.4, 11.3]	8.9 [7.3, 11.0]	8.9 [7.3, 11.3]	0.971
Phosphorus (mg/dL)	3.6 [3.3, 8.5]	4.5 [2.2, 9.2]	4.3 [2.2, 9.2]	0.541
Total cholesterol (mg/dL)	126.0 [95, 257]	137.5 [80, 258]	135.0 [80, 258]	0.422
HDL cholesterol (mg/dL)	35.3 [28.0, 50.1]	40.0 [23.6, 72.0]	38.7 [23.6, 72.0]	0.051
LDL cholesterol (mg/dL)	75.0 [53.0, 105.0]	75.5 [33.0, 164.0]	75.0 [33.0, 164.0]	0.876
Tryglyceride (mg/dL)	102.0 [38, 658]	90.0 [29, 390]	90.0 [29, 658]	0.701
Ferritin (ng/mL)	208.0 [22.3, 613.4]	220.1 [14.7, 617.5]	217.3 [14.7, 968.3]	0.632
25-OH Vitamin D (ng/mL)	13.7 [5.4, 26.2]	14.8 [5.1, 27.1]	13.7 [5.1, 27.1]	0.869
Intact PTH (pg/mL)	108.5 [34.5, 827.3]	129.3 [14.7, 968.3]	125.9 [14.7, 968.3]	0.548
hs-CRP (mg/L)	0.8 [0.3, 9.47]	0.87 [0.17, 31.73]	0.85 [0.17, 31.73]	0.755

*Data are expressed as median [min, max] or n (%)

◆ Data from ambulatory blood pressure monitoring of the patient group

	Dipper (n=11)	Non-dipper (n=38)	Total (N=49)	P-value
24-hour SBP (mmHg)	128.0 [109, 141]	135.8 [95, 175]	133.5 [95, 175]	0.069
24-hour DBP (mmHg)	71.0 [58, 86]	78.8 [55, 104]	77.0 [55, 104]	0.027
Daytime SBP (mmHg)	131.0 [108, 147]	136.0 [92, 173]	136.0 [92, 173]	0.320
Daytime DBP (mmHg)	71.0 [60, 86]	78.0 [55, 139]	77.0 [55, 139]	0.084
Nighttime SBP (mmHg)	112.0 [87, 129]	137.0 [88, 172]	129.0 [87, 172]	<0.001
Nighttime DBP (mmHg)	67.0 [50, 76]	78.5 [54, 107]	75.0 [50, 107]	<0.001

*Data are expressed as median [min, max]

◆ Follow-up laboratory examination data

	Dipper (n=11)				Non-dipper (n=38)				Total (N=49)			
	Visit1	Visit2	Visit3	Visit4	Visit1	Visit2	Visit3	Visit4	Visit1	Visit2	Visit3	Visit4
Hemoglobin (g/dL)	10.8	10.8	10.8	10.9	10.8	10.7	10.6	9.8	10.6	10.7	10.7	10.1
Calcium (mg/dL)	8.9	9.0	8.8	8.7	8.9	8.9	8.8	9.0	8.9	8.9	8.8	8.9
Phosphorus (mg/dL)	4.5	4.5	4.4	4.5	4.5	5.1	4.7	5.0	4.7	5.0	4.7	4.8
Total cholesterol (mg/dL)	139.7	123.6	111.4	127.4	139.7	135.3	139.8	140.0	140.6	132.7	133.0	136.7
Ferritin (ng/mL)	208.0	300.7	260.8	289.6	208.0	263.0	263.8	300.6	217.3	271.4	263.2	297.6
Intact PTH (pg/mL)	174.8	279.3	301.3	266.0	174.8	300.8	266.3	339.7	209.4	295.9	274.1	320.4
hs-CRP (mg/L)	2.2	2.0	3.3	15.1	2.2	6.6	5.2	6.7	3.0	5.6	4.8	9.0

*Data are expressed as only median value

*Red colored values are $P<0.05$ when it was compared with visit 1 value

DISCUSSION & SUMMARY

- ◆ We found that the two groups were not significantly different in baseline characteristics.
- ◆ By definition, mean daytime SBP, 24-hour SBP, and daytime DBP, were not different among dipper and non-dipper hypertensive groups. However, 24-hour DBP, nighttime SBP and nighttime DBP were significantly higher in the non-dipper group than in dipper group ($P<0.05$)
- ◆ This study is still on-going and more data should be collected to evaluate major parameters such as oxidative stress markers, CA-IMT, BIA, ABI, and long term laboratory findings between the two groups.

