



# Serum Uric Acid Levels And Inflammatory Markers with Respect to Dipping Status: A Retrospective Analysis of Hypertensive Patients with or without Chronic Kidney Disease

Elbis Ahbap<sup>1</sup>, Tamer Sakaci<sup>1</sup>, Ekrem Kara<sup>1</sup>, Tuncay Sahutoglu<sup>1</sup>, Yener Koc<sup>1</sup>, Taner Basturk<sup>1</sup>, Mustafa Sevinc<sup>1</sup>, Cuneyt Akgol<sup>1</sup>, Arzu O. Kayalar<sup>1</sup>, Zuhail A. Ucar<sup>1</sup>, Feyza Bayraktar<sup>1</sup>, Nuri Baris Hasbal<sup>1</sup>, Mahmoud Isleem<sup>1</sup>, Perin Nazif<sup>1</sup>, Abdulkadir Unsal<sup>1</sup>

<sup>1</sup>Sisli Etfal Training and Research Hospital, Department of Nephrology, Istanbul, Turkey.

<sup>II</sup> Recep Tayyip Erdogan University, School of Medicine, Rize Educational and Research Hospital, Internal Medicine, Nephrology, Rize, Turkey

## Objectives:

The aim of this study was to evaluate serum uric acid levels, inflammatory markers [C-reactive protein (CRP), neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR)] and mean platelet volume (MPV) among hypertensive patients with or without chronic kidney disease (CKD) with respect to dipping status.

## Methods:

A total of 432 hypertensive patients with (n=340) or without (n=92) CKD who had ambulatory blood pressure monitoring (ABPM) recordings were included. Correlation of serum uric acid levels with inflammatory markers (CRP, PLR, NLR) was evaluated as was the logistic regression analysis for determinants of non-dipper pattern.

## Results:

Non-dipper pattern was noted in 65.2% and 79.7% of non-CKD and CKD patients, respectively. Multivariate logistic regression analysis revealed that only serum uric acid (OR, 2.69; 95% CI, 1.60 to 4.52; p=0.000), MPV (OR, 1.81; 95% CI, 1.30 to 2.53; p=0.000), PLR (OR, 0.98; 95% CI, 0.97 to 0.99; p=0.000) and serum albumin (OR, 0.42; 95% CI, 0.19 to 0.93; p=0.031) were significant determinants of non-dipper pattern in the overall study population.

Table 1. Baseline demographic and clinical characteristics

	Chronic kidney disease					
	Absent (n=92)			Present (n=340)		
	Dipper (n=32)	Non-dipper (n=60)	p value	Dipper (n=69)	Non-dipper (n=271)	p value
	mean(SD)			mean(SD)		
Age (years)	56.6(10.7)	56.9 (12.0)	0.904	58.0(14.0)	58.3(12.1)	0.813
Gender (M/F)	16/16	40/20	0.119	32/37	129/142	0.856
BMI (kg/m <sup>2</sup> )	30.9(2.9)	28.9(5.0)	0.587	31.4(5.2)	30.8(5.4)	0.576
Drug use	n(%)			n(%)		
ACE inhibitors	7 (21.8)	13 (21.6)	0.98	14(20.3)	57(21.0)	0.75
AT1-R blockers	12(37.5)	24(40.0)	0.67	28(40.6)	107(39.5)	0.88
Beta-blockers	7 (21.8)	13 (21.6)	0.85	16(23.2)	61(22.5)	0.56
CCBs	4(12.5)	8(13.3)	0.65	9(13.2)	38(14.0)	0.72
Diuretics	7(21.9)	12(20.0)	0.52	14(20.3)	57(21.0)	0.64
ABPM recordings (mmHg)	mean(SD)			mean(SD)		
Overall, 24 h						
Systolic BP	141.4(13.5)	147(18.1)	0.105	157.5(20.5)	152.5(20.3)	0.059
Diastolic BP	84.6(10.7)	86.4(12.3)	0.486	87.9(14.9)	83.5(14.6)	0.029
Daytime						
Systolic BP	147.1(14.4)	147.6(17.7)	0.837	163.5(21.6)	152.5(20.1)	<0.001
Diastolic BP	89(11.9)	87.1(12.9)	0.360	92.3(16.0)	94.4(14.7)	<0.001
Night-time						
Systolic BP	124.6(12.8)	144.9(19.9)	<0.001	138.1(17.9)	152.8(23.2)	<0.001
Diastolic BP	71.5(9.2)	83.6(13.4)	<0.001	74.4(13.1)	80.8(15.3)	0.001
Average nocturnal dipping						
Systolic	15.3(4.6)	1.8(6.2)	<0.001	15.3(5.4)	0.02(6.6)	<0.001
Diastolic	19.4(6.7)	4.1(10.2)	<0.001	19.1(7.6)	4.2(8.4)	<0.001

ABPM: Ambulatory blood pressure monitoring; ACE: Angiotensin-converting enzyme; AT1-R: angiotensin II type 1 receptor; BMI: body mass index; BP: blood pressure; CCBs: calcium channel blockers

Table 2. Correlation of uric acid levels with inflammatory markers

	Chronic kidney disease							
	Absent				Present			
	Dipper (n=32)		Non-dipper (n=60)		Dipper (n=69)		Non-dipper (n=271)	
	rho	p	rho	p	rho	p	rho	p
CRP	0.787	<0.001	0.750	<0.001	0.663	<0.001	0.664	<0.001
NLR	0.774	<0.001	-0.023	0.860	0.831	<0.001	0.688	<0.001
PLR	0.726	<0.001	0.761	<0.001	0.755	<0.001	0.832	<0.001
MPV	0.748	<0.001	0.886	<0.001	0.565	<0.001	0.740	<0.001

CRP: C-reactive protein; MPV: mean platelet volume; NLR: neutrophil to lymphocyte ratio; PLR: platelet to lymphocyte ratio

## Conclusions:

Our findings revealed higher prevalence of non-dipper pattern in hypertensive patients with than without CKD and significantly higher levels for uric acid, CRP, MPV, PLR and NLR among non-dipper than dipper hypertensive patients with CKD. High levels for uric acid and MPV and lower levels for PLR and serum albumin were noted as significant determinants of non-dipper pattern among hypertensive patients.