

PP-037

Evaluation of Neutrophil Lymphocyte Ratio, Tp-E Interval and Tp-E/QT Ratio in Subjects with Hypertension and Prehypertension

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Objectives: Preliminary evidence has suggested the role of inflammation in development and prognosis of cardiovascular diseases. Hypertension is strongly associated with chronic systemic inflammation. The total white blood cell count and its subtypes, such as neutrophil, lymphocyte, and neutrophil/lymphocyte ratio (NLR), can be used as an indicator of systemic inflammation. Neutrophil/lymphocyte ratio (NLR) has been associated with poor outcomes in patients with several cardiovascular diseases. However, there is limited data about the role of NLR in patients with hypertension and prehypertension. Recently, several studies have suggested that the interval from the peak to the end of the electrocardiographic T wave (Tp-e) may correspond to the transmural dispersion of repolarization and that increased Tp-e interval and Tp-e/QT ratio are associated with malignant ventricular arrhythmias and cardiovascular mortality. However, this method has not been used to evaluate dispersion of repolarization in subjects with hypertension and prehypertension. Accordingly, the present study was designed to evaluate NLR, Tp-e interval and Tp-e/QT ratio subjects with hypertension and prehypertension.

Study Design: Between September 2012 and April 2013, the hypertensive, prehypertensive and normotensive healthy subjects who were admitted to our outpatient clinic were evaluated. According to inclusion and exclusion criteria the overall study population consisted of 95 subjects: 28 healthy volunteers with normal blood pressure (BP) (group I), 35 subjects with prehypertension (group II), and 32 patients with new onset hypertension (group III). No patient had a recent history of an acute infection or an inflammatory disease. The NLR was calculated by dividing neutrophil count to lymphocyte count. These Tp-e interval and Tp-e/QT ratio were measured from a 12-lead electrocardiogram, and the Tp-e interval corrected for heart rate. These parameters were compared among groups.

Results: Demographic, clinical, and electrocardiographic parameters of the groups are shown in Table 1. Whereas NLR was similar among groups ($p>0.05$), corrected Tp-e interval and and Tp-e/QT ratio were significantly increased in patients with hypertension when compared with controls and prehypertension subjects ($p<0.05$).

Conclusion: NLR, as an indicator of systemic inflammation, was similar in subjects with normotensives, prehypertension and hypertension. Tp-e interval and Tp-e/QT ratio were increased in hypertension patients with respect to normal subjects. These parameters were similar to controls in prehypertension stage. Our results may contribute to pathophysiological mechanisms of increased prevalence of ventricular arrhythmias and cardiovascular mortality risk by indicating increased ventricular repolarization heterogeneity in hypertension patients.

Table 1. Demographic, laboratory, and electrocardiographic characteristics of the study groups

	Group I: Normotensive controls (n=28)	Group II: Prehypertension (n=35)	Group III: Hypertension (n=32)
Age (years)	44.8±10.8	44.1±12.5	47.6±9.9
Males / Females	10/18	13/22	13/19
BMI (kg/m ²)	28.6±3.2	29.1±4.9	29.2±4.1
Systolic BP (mmHg)	115.9±7.8	134.6±16.5 *	160.8±19.3 * #
Diastolic BP (mmHg)	71.2±6.9	81.4±9.1 *	94.2±8.2 * #
Heart rate (beats/min)	75.3±11.1	78.9±12.4	79.5±12.3
LV EDD (mm)	46.3±3.4	47.1±3.7	48.2±3.0
LV EF (%)	66.2±2.8	66.5±2.8	65.9±2.6
LA dimension (mm)	33.9±3.5	33.8±3.4	36.5±3.1 ¥
Fasting glucose (mg/dl)	90.9±6.4	93.4±6.8	94.5±8.3
Creatinine (mg/dl)	0.76±0.12	0.77±0.19	0.79±0.19
Hemoglobin (g/dl)	13.8±1.0	13.8±1.6	14.1±1.5
WBC (K/uL)	7.2±1.3	7.7±1.8	7.3±1.5
Neutrophils (K/uL)	2.0±0.8	2.1±0.8	2.2±0.9
Lymphocytes (K/uL)	2.2±0.5	2.3±0.5	2.1±0.6
N/L ratio	2.04±0.8	2.08±0.8	2.18±0.9
Mean platelet volume (fL)	8.0±0.61	8.3±0.77	8.1±0.70
CRP (mg/l)	4.2±1.4	4.0±1.3	3.9±1.1
cQTd (ms)	34.3±11.0	33.4±9.1	47.8±16.2 * #
cTp-e (ms)	95.6±14.3	98.0±11.6	107.0±10.7 @ \$
Tp-e/QT	0.22±0.03	0.22±0.03	0.25±0.03 & ^

*: $p<0.001$ vs group I, #: $p<0.001$ vs group II, ¥: $p=0.02$ vs group I and group II, @: $p=0.002$ vs group I, \$: $p=0.01$ vs group II, &: $p=0.004$ vs group I, ^: $p=0.003$ vs group II BMI: body mass index, BP: blood pressure, LVEDD: left ventricular end-diastolic dimension, LV EF: left ventricular ejection fraction, LA: left atrium, WBC: white blood count, N/L ratio: Neutrophils to lymphocytes ratio, CRP: C-reactive protein, cQTd: corrected QT dispersion, cTp-e corrected transmural dispersion of repolarization.

PP-038

Effect of Masked Hypertension on Aortic Elastic Properties

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Aortic stiffness is increased in patients with sustained hypertension (SH). The aim of this study was to investigate the relationship between aortic elastic properties and masked hypertension (MH). We evaluated aortic elastic properties in 35 individuals with MH, 35 patients with SH, and 35 normotensive healthy volunteers using thoracic Doppler echocardiography. All aortic distensibility values were carried out at the same time or immediately after the blood pressure (BP) measurement. Baseline clinical and demographic characteristics of the patients were similar in all three groups. Aortic stiffness index and elastic modulus values were higher in MH group compared to SH group and control group (8.9 6.3 vs. 5.4 2.2 vs. 4.2 2.5, $P<.001$ and 9.0 6.3 vs. 6.4 2.5 vs. 4.1 2.4, $p<.001$, respectively). Aortic strain values were lower in MH group compared to SH group and control group (7.4 5.3 vs. 9.5 4.1 vs. 14.6 7.1, $p<.001$, respectively). Aortic distensibility values were lower inMHand SH groups compared to controls (3.1 1.9 vs. 3.7 1.6 vs. 6.4 3.4, $p<.001$, respectively). Furthermore, diastolic aortic diameter, left ventricular mass index, interventricular septum, and posterior wall thickness were higher inMHand SH groups when compared to controls. This study shows that masked hypertensive patients are at higher risk of "aortic" stiffness, a risk factor for cardiovascular morbidity and mortality, than normotensive and sustained hypertensive patients.

PP-039

Effect of Diurnal Blood Pressure on Myocardial Performance Index and Aortic Elasticity Parameters in Essential Hypertensive Patients

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Hypertension is principal problem increasing nowadays and threatens community health by its complications. In healthy adults, blood pressure levels decrease

nocturnally. 'Dipper' are the ones whose systolic blood pressure decrease >10% at night and 'nondipper' are the ones whose systolic blood pressure decrease <10% at night. In the nondippers group cardiovascular morbidity and mortality are increased. Myocardial performance index (MPI) is a relatively new index which can be used in evaluation systolic and diastolic performance and may have prognostic value for a variety of heart diseases.

Our aim in this study is to search for the effect of diurnal blood pressure on myocardial performance index and aortic elasticity parameters in essential hypertensive patients.

Our study comprised 30 dippers, 31 nondippers hypertensive patients and 25 healthy volunteers. Ambulatory blood pressure monitoring (ABPM) was hooked-up to hypertensive patients and they were grouped as dippers and nondippers. All individuals were measured aortic elasticity parameters and MPI by used to transthoracic echocardiography (Figure 1).

The groups are similar in terms of age, sex, body mass index, using cigarette and biochemical parameters. There was no significant difference between the groups in terms of MPI ($p=0.110$). Aortic strain index was lower in control group than dipper hypertensive and nondipper hypertensive group ($p<0.0001$, $p<0.0001$ respectively), and distensibility index was lower in control group than dipper and nondipper hypertensive group ($p<0.0001$, $p<0.0001$ respectively). The index of aortic stiffness; there was no significant difference between the control and dipper hypertensive groups ($p=0.087$). However, the aortic stiffness index in nondipper hypertensive group was higher than dipper hypertensive group ($p<0.0001$).

In our study we found a relationship among nondipper hypertension decreased aortic strain and aortic distensibility and increased aortic stiffness. Also, dipper hypertension related to decreased aortic strain and aortic distensibility. Nondipper hypertension known has more increased cardiovascular event and mortality risk. In this context, patients with hypertension should be followed with ABPM. Therefore nondipper hypertensive patients which have a higher risk can be identified. Thus, efforts for controlling blood pressure in nondipper hypertensive patients provide better risk modification.

PP-040

Correlation between Left Ventricular Mass Index and Calcium Metabolism in Patients with Essential Hypertension

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Introduction: Essential hypertension is a multifactorial condition affecting a large percentage of the adult Turkish population (33.7%). It induces Left ventricular hypertrophy (LVH) and dilatation, which can lead to heart failure. The reasons for the development of LVH in patients with essential hypertension have not been established, and whether or not LVH results from long-term blood pressure (BP) elevation or non-hemodynamic factors affecting the myocardium is still a matter of debate. The purpose of the present study was to determine the relationship between calcium metabolism and hypertension by comparing healthy individuals and patients newly diagnosed with mild and moderate essential hypertension, and to elucidate the role of non-hemodynamic factors in the development of LVH in the hypertensive group.

Material-Methods: Twenty-seven patients with essential hypertension and 20 healthy individuals were compared with respect to calciotropic hormones, left ventricular mass index (LVMI), and urinary and serum biochemical parameters (Table 1) (Table 2). The correlations between parathormone, vitamin D, and calcitonin levels and LVMI and blood pressure elevation were determined. Written informed consent was obtained from each subject following a detailed explanation of the objectives and protocol of the study which was conducted in accordance with the ethical principles stated in the "Declaration of Helsinki" and approved by the institutional ethics committee. The data were analyzed using the Statistical Program for the Social Sciences (version 10.0; SPSS, Inc., Chicago, IL, USA).

Results: The parathormone level was significantly higher ($p=0.006$) and vitamin D level was significantly lower ($p=0.01$) in the patient group compared with the control group. However, the two groups were similar in terms of albumin-corrected calcium levels, which were within the normal range ($p=0.988$). The serum sodium ($p=0.014$) and urinary calcium ($p=0.003$) levels and LVMI ($p<0.01$) were also significantly higher in the patient group. No significant correlations were determined between ambulatory blood pressure and parathormone and vitamin D levels, but a significant correlation was found between LVMI and parathormone level ($p=0.06$) in hypertensive patients.

Discussion: We suggest that essential hypertension alters calcium metabolism. Specifically, calciuresis develops secondary to hypertabolism. Specifically, calciuresis develops secondary to hypernatremia, with a compensatory release of PTH. Meanwhile, the increased levels of PTH cause a rise in general protein synthesis, which leads to the development of myocardial hypertrophy. However, since the small sample size in the present study precludes our ability to draw precise conclusions, an in-depth analysis of the relationship between PTH, vitamin D, and blood pressure, via future large-scale studies, is warranted.

Comparison of serum biochemical parameters in patient and control groups

	Patient group n:27, Mean \pm SD	Control group n:20, Mean \pm SD	p value
Na (mmol/L)	141.18 \pm 4.37	139.95 \pm 9.5	0.014
K (mmol/L)	4.20 \pm 0.34	4.27 \pm 0.31	0.492
Ca (mg/dL)	9.69 \pm 0.38	9.69 \pm 0.26	0.988
P (mg/dL)	3.09 \pm 0.48	2.90 \pm 0.38	0.147
ALP (U/L)	166.56 \pm 59.51	178.30 \pm 41.76	0.431
Urea (mg/dL)	32.22 \pm 5.92	34.95 \pm 6.72	0.147
Creatinine (mg/dL)	0.92 \pm 0.17	0.94 \pm 0.14	0.718
Calcitonin (pg/mL)	8.49 \pm 5.54	6.03 \pm 2.83	0.054
Osteocalcin (ng/mL)	10.30 \pm 8.08	10.21 \pm 5.25	0.068
PTH (pg/mL)	53.74 \pm 23.46	37.7 \pm 17.22	0.006
Vitamin D (ng/mL)	11.03 \pm 1.57	17.38 \pm 7.21	0.010

viding LVM by body surface area. Na: sodium, K: potassium, Ca: calcium, P: phosphorus, ALP: alkaline phosphatase, PTH: parathormone, SD: standard deviation

Comparison of biochemical parameters in 24-hour urine samples in patient and control groups

	Patient group n:27 Mean \pm SD	Patient group n:20 Mean \pm SD	p value
Urinary Ca (mg/24 h)	275.56 \pm 82.09	203.50 \pm 72.00	0.003
Urinary P (g/24 h)	0.86 \pm 0.24	0.92 \pm 0.23	0.409
OH-proline OH-proline (mmol/mol c)	9.92 \pm 6.64	10.99 \pm 2.86	0.461
Urinary creatinine (g/24 h)	1.31 \pm 0.39	1.42 \pm 0.39	0.349

Ca: calcium, P: phosphorus, OH-proline: hydroxyproline, SD: standard deviation, c:creatinin

PP-041

Exaggerated Systolic Blood Pressure During Treadmill Test in Pre-Hypertensive Patients with Dilatation of Ascending Aorta

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Aim: Prehypertension is a clinical condition in which initiation of antihypertension therapy other than lifestyle modification was disputable. Additionally there is not a provocative test which could clarify whether the blood pressures innocently continue below the high normal ranges. Moreover, aortic diameter which is out of the normal visual perspective such as the ascending aorta is generally overlooked during an echocardiographic examination at parasternal long axis view. So we aimed to evaluate the aortic diameters measured at ascending aorta in pre-hypertensive patients and to analyze the systolic and diastolic blood pressure and also heart rate response during the initiation, stage 0, 1, 2 and 3 and recovery period of treadmill test.

Material-Method: We retrospectively evaluated the medical recordings including aortic root and ascending aorta from the echocardiographic examination report and systolic and diastolic blood pressure and heart rate responses measured at initiation, 1st, 2nd, 3rd stage and recovery period of treadmill test. We excluded the subjects with coronary artery disease, hypertension, congestive heart failure, and aortic aneurysm (ascending aorta ≥ 40 mm) from the study. We compared those measurements obtained from the treadmill test among groups designed according diameter of ascending aorta ≤ 35 mm (normal subjects) and >35 mm (subjects with aortic dilatation).

Results: Age of study groups was not statistically different. Comparison of mean diameter of aortic root and ascending aorta was as follows (32.8 \pm 1.49 vs 32.9 \pm 1.27, $p=0.69$) and (34.5 \pm 0.96 vs 35.9 \pm 1.0, $p=0.00$), respectively. When we compared the SBP, DBP and HR responses during TT we observed that SBP tended to increase to a higher state in pre-hypertensive subjects with dilated aorta compared to ones with normal aorta (Figure 1). However there was not such a tendency to increase in DBP and HR in those subjects. Also heart rates were surprisingly lower in those subjects at the initial period. Increased pressure to aortic baroreceptor might have been probably caused the heart rate to be reflexively reduced.