Ratio of Variability of Blood Pressure to that of Heart Rate May Predict Survival and is Strongly Affected by Beta Blockers

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Abstract:

Previously we found the blood pressure variability [expressed as the 24-hour standard deviation (SD)] ratio (BPVR) of systolic (SBP) to diastolic blood pressure (DBP) during ambulatory blood pressure monitoring (ABPM), to predict mortality. Here we investigate the predictive role of ratio of SBP and DBP to heart rate (HR) variability. **We** analyzed 1259 ABPM records of treated hypertensive patients (age 55±16, 54% male, 9% with diabetes), followed 5 years for mortality. The indices, SHVR and DHVR were defined as the variability ratio between SBP & HR and DBP & HR respectively. The difference between mean value of an index (or variability) of the 77 patients who died and the 1183 survivors was estimated using a multi-linear regression model that included the covariates age, gender, body mass index, mean arterial pressure, pulse pressure, diabetes, and antihypertensive drug class (ACE inhibitors, β-blockers,calcium channel blockers, diuretics and α-blockers) are shown in the table

	BPVR	SHVR mmHg/bpm	DHVR mmHg/bpm	SD SBP mmHg	SDDBP mmHg	SD HR bpm
survived	1.39±0.32	1.87±0.95	1.35±0.57	15.7±4.2	11.5±2.5	9.7±3.8
died	1.62±0.40	2.78±1.45	1.68±0.68	17.1±4.9	10.8±2.9	7.3±2.8
Diff./SD	21%	42%	25%	10%	-7%	-22%
p-value	<0.05	<0.0001	<0.05	ns	ns	<0.05
Unadjusted mean?SD for the two groups and adjusted difference per SD of the whole population.						

Cox regression models similarily adjusted, were used to calculate 5 years mortality**:** only SHVR and DHVR were significantly associated with mortality hazard ratio 1.18 95%confidence interval (CI) 1.03-1.34, and 1.70 95%CI 1.10-2.64 respectively. An adjusted multilinear model that measures by how much the value of the predictor is *greater* in those who died than in the survivors, found β-blockers to be a highly significant affector of SHVR (+0.58), and DHVR (+0.41), p<0.0001.Thus SHVR and DHVR are potential independent predictors of mortality in treated hypertensive patients but are both greatly affected (as expected from the role of HR in these ratios) by β-blockers.

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