

Association of heart rate variability disorders and daily blood pressure profile in patients with hypertension and diabetes mellitus 2 type with different body weight

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Objective: To establish the relationship between impaired heart rate variability (HRV) and blood pressure (BP) daily profile in patients with arterial hypertension (AH) and diabetes mellitus 2 type (DM-2) with different body weight.

Material and methods. This study was performed on 27 patients with hypertension and type 2 diabetes mellitus with the body mass index (BMI) $34,4 \pm 1,5$ kg / m² (group 1) and 25 patients with hypertension and type 2 diabetes with BMI of $23,7 \pm 1,3$ kg / m² (group 2). Demographic characteristics recorded at the first visit included age, sex, height, weight, medication, smoking history, and other diseases. Were estimated the 24-hour blood pressure monitoring (ABPM) and 24 hour Holter ECG monitoring (HMEKG) with an estimate of spectral parameters of HR. The analysis of HRV included time parameters: normal-to-normal (NN) intervals, standard deviation of the NN intervals (SDNN), the square root of the mean squared differences of successive NN intervals (RMSSD), the number of interval differences of successive NN intervals greater than 50 ms (NN50), and pNN50-the proportion derived by dividing NN50 by the total number of NN intervals, SDNN - estimate of overall HRV, HRV triangular index - estimate overall HRV, SDANN - estimate of long-term components of HRV, and RMSSD-estimate of short-term components of HRV, and HRV triangular index. The analysis of HRV also included the spectral parameters: TP, LF and HF, LFn, HFn, ratio LF/HF and their circadian fluctuation. The following parameters were assessed: LF – low frequency [ms²] range 0.5 - 0.05 Hz: component of sympathetic nervous system activity; HF – high frequency [ms²] range 0.15 - 0.5 Hz: component of parasympathetic nervous system activity; VLF – very low frequency [ms²] range < 0.05 Hz – component expressing the activity of renin – angiotensin system and thermoregulation; LF/HF – temporary activity of ANS (sympathovagal balance); TP – total power [ms²].

Results. Patients of first group RRNN indicators, RMSSD, LF and VLF were significantly lower ($p < 0.05$), BP variability higher ($p < 0.05$), and abnormal circadian blood pressure profile is more common than in patients of second groups. The lowest values of the LF and HF indices, characterizing the tone of the parasympathetic and sympathetic nervous system, have been observed in patients of 1st group. LF indicators have been also reduced in patients of 1st group, but the LF / HF values were not significantly different between groups 1 and 2. In patients with type 2 diabetes mellitus and hypertension in both groups showed a decrease as the tone of the parasympathetic (HF), and sympathetic (LF) divisions of the autonomic nervous system. The results of presented investigation did not show any differences between HRV parameters and the degree of blood pressure increment.

It has been proved to significant correlation between the high BMI, HRV parameters and circadian blood pressure profile.

Conclusions. Hypertensive patients with type 2 diabetes mellitus with increasing BMI is more significant decrease in HRV, increased blood pressure variability and violation of diurnal blood pressure profile. Such patients in addition to therapy of hypertension and type 2 diabetes mellitus need body mass correction to reduce cardiovascular risk.