



Indicators of Heart Rate Variability in Elderly Persons with Autonomic Dystonia Syndrom

Ismigul Abbosova¹, Janna Nazarova², Iroda Rustamova¹

¹Andijan State Medical Institute Andijan, Uzbekistan

²Associate Professor, Department of Neurology, Tashkent Institute of Postgraduate Medical Education, Tashkent, Uzbekistan.

Abstract

The publication discusses the indicators of heart rate variability in elderly people with autonomic dystonia syndrome. 180 patients with CCI of the second stage were studied; the average age was 67.4 ± 6.1 years. The patients were divided into two groups. Group I consisted of 118 patients (62.2% of the total number of patients) with stage 2 chronic cerebral ischemia (CCI) with ADS, group 2 consisted of 62 patients (34.4%) with stage 2 CCI without ADS. A comprehensive assessment of the functional state of the regulatory systems revealed the stress of the adaptive capabilities of the heart rate regulation systems in the groups of examined elderly people with ADS, which was most pronounced in females.

Key words: Heart rate variability, elderly, autonomic dystonia syndrome.

INTRODUCTION

An important task in the prevention of diseases and the prevention of health disorders is the early diagnosis of preclinical functional changes in the regulatory systems of the body, which are often determined in the process of screening studies (Korovina, N. A. *et al.*, 2006; Volodin, N. N. *et al.*, 2007; Khasanov, A. 2016)

At present, thanks to non-invasive technologies, it is possible to diagnose and study various diseases with high prognostic significance. Among the methods with high sensitivity and prognostic significance, which determine the functional characteristics of the body based on changes in the electrophysiology of the heart, the method of analyzing heart rate variability (HRV) and dispersion mapping (DM) of the electrocardiogram (ECG) is increasingly used (1,4,6).

At the same time, the information content of HRV ECG in assessing prenosological conditions in populations of practically healthy individuals and a number of aspects of individual characteristics of variation in HRV characteristics depending on the initial level of activity of various parts of the autonomic (autonomic) nervous system (ANS) remain little studied.

All of the above provided the basis for the present study.

Purpose of the study

To study the intensity of the sympathetic link of autonomic regulation according to HRV data in elderly people with autonomic dystonia syndrome.

MATERIAL AND METHODS

The clinical part of the work was carried out in the advisory polyclinic of ASMI in the period from 2019 to 2022. 180 patients with CCI of the second stage were under observation. The patients included 62 (37.8%) men and 118 (62.2%) women. The age of the patients ranged from 60 to 75 years the average age was 67.4 ± 6.1 years.

Group I consisted of 118 patients (62.2% of the total number of patients) with stage 2 chronic cerebral ischemia (CCI) with ADS (42 men (35.6%) and 76 women (64.4%)), group 2 consisted 62 patients (34.4%) with stage 2 CCI without ADS (26 men (41.9%) and 36 women (58.1%)).

The autonomic regulation of heart rate was studied by the method of mathematical analysis of heart rate variability (HRV) using the software and hardware complex "Varicard 2.5". An ECG was recorded for 5 minutes in the wedge position, then a clinooorthostatic test was performed. Statistical analysis included the study of SDNN (ms), RMSSD (ms), pNN50 (%); spectral analysis - in % HF, LF, VLF-waves; variational pulsometry - Mo (ms), AMo (ms), SI (conventional

Corresponding Author

Ismigul Abbosova;

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units). A comprehensive assessment of HRV was carried out on the basis of the indicator of activity of regulatory systems (IARS) with differentiation of various degrees of tension of regulatory systems.

The research materials were subjected to statistical processing using the methods of parametric and non-parametric analysis. Accumulation, correction, systematization of initial information and visualization of the obtained results were carried out in Microsoft Office Excel 2016 spreadsheets. Statistical analysis was carried out using the IBM SPSS Statistics v.23 program (developer - IBM Corporation).

RESEARCH RESULTS

An analysis of statistical indicators of heart rate (SDNN, RMSSD) in elderly people with ADS

revealed a shift in the autonomic balance towards parasympathetic activity on heart activity at rest relative to patients without ADS (Figure 1). In the course of performing the orthotest, the studied parameters showed a downward trend associated with an increase in sympathetic influences, which are more characteristic of ADS.

In the cuneiform position, the SI values in group I were 124.6 ± 41.9 arb. units. and in group II - 135.4 ± 26.2 units, which indicates the dominance of sympathetic influences, which are most pronounced in elderly people with ADS. In orthostasis, the highest values were found in patients with ADS (327.5 ± 94.2 units) relative to elderly people without ADS (301.4 ± 103.7 units), which is associated with an increase in the central mechanisms of regulation on rhythm hearts.

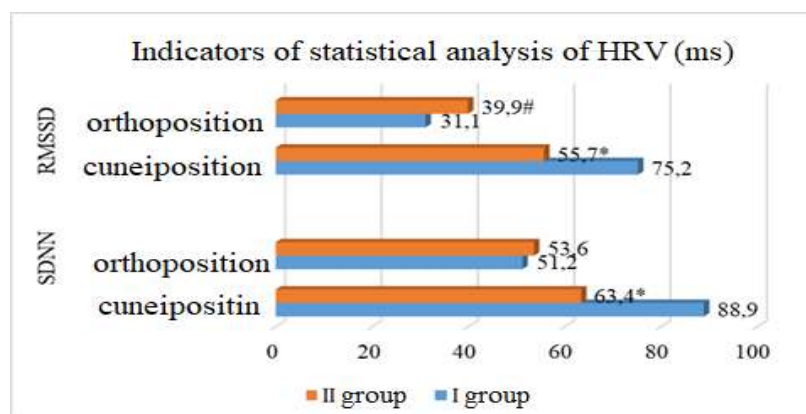


Figure 1. Indicators of statistical analysis of HRV (ms) in the elderly, depending on the syndrome of autonomic dystonia.

Note: *- $p < 0.01$ (reliability of HRV indicators in cuneiform position); # - $p < 0.01$ (significance of HRV indicators in orthoposition);

Taking into account the spectral analysis index of HRV HF% in groups in the cuneiform position, a pronounced predominance of the para-

sympathetic link of regulation was observed (Figure 2).

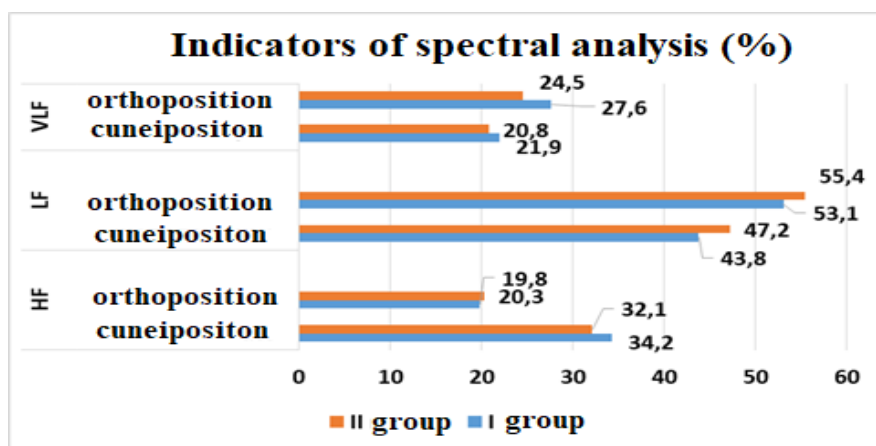


Figure 2. - Indicators of spectral analysis in the elderly, depending on the presence of ADS (%).

The performance of the exercise test led to an increase in the sympathetic effects of the ANS on the heart rate, the most pronounced in group I ($19.8 \pm 2.4\%$). In the wedge and ortho positions, the LF% indicator was higher than the norm in both groups of boys, and the VLF% values did not go beyond the norm.

The study of intragroup differences in the percentage distribution of PARS in the elderly revealed the dominance of moderate PARS₃₋₄ tension in group I in 41.6% of patients and severe PARS₄₋₆ tension in 52.7% of patients (Figure 3).

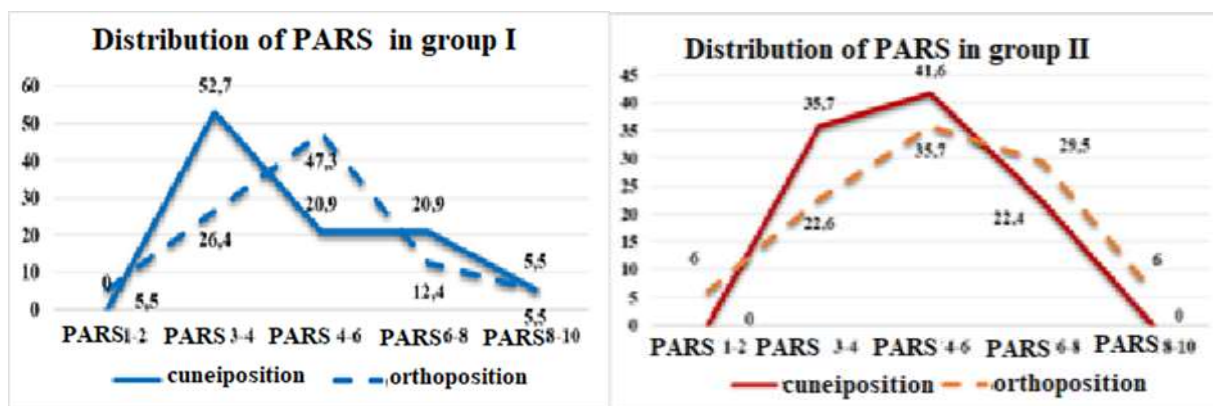


Figure 3. Distribution of PARS (%) among the elderly, depending on the presence of ADS

In the ortho position, 35.7% of group II and 47.3% of group I had a predominance of pronounced tension. The percentage of people with overstrain of regulatory systems in group I increased by 29.7%, and in group II decreased by 15.3%.

Thus, taking into account the indicators of heart rate variability (SDNN, RMSSD, Mo, AMo, SI, HF, LF, VLF), instability of the vegetative supply of heart rate in the elderly with ADS was revealed, manifested in the predominance of sympathetic activity at rest and a shift in the autonomic balance towards sympathetic activity when performing a clinorthostatic test. In the

elderly without ADS, autonomic homeostasis was more stable. The established features indicate the functional lability of the heart rhythm regulatory apparatus, which in the future can lead to a decrease in the adaptive capabilities of regulatory systems.

A comprehensive assessment of the functional state of the regulatory systems revealed the stress of the adaptive capabilities of the heart rate regulation systems in the groups of examined elderly people with ADS, which was most pronounced in females.

CONCLUSION

The results obtained indicate the need for special attention in relation to persons with an initial sympathetic type of autonomic regulation, in order to identify early signs of myocardial dysfunction during screening preventive examinations.

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