



## Variety of blood pressure reactions in patients of Truskavets' SPA and their hemodynamic, autonomic and hormonal accompaniments

Kozyavkina Nataliya V.<sup>1</sup>, Voronych-Semchenko Nataliya M.<sup>2</sup>, Vovchyna Yuliya V.<sup>2</sup>,  
Zukow Walery<sup>3</sup>, Gozhenko Olena A.<sup>4</sup>, Popovych Igor L.<sup>1,4</sup>

Editor: Constantin MUNTEANU, E-mail: [office@bioclima.ro](mailto:office@bioclima.ro)



Balneo and PRM Research Journal

DOI: <http://dx.doi.org/10.12680/balneo.2021.452>

Vol.12, No.3 September 2021

p: A17

<sup>1</sup>Kozyavkin Rehabilitation Clinic, Truskavets', Ukraine [clinic@kozyavkin.com](mailto:clinic@kozyavkin.com);

<sup>2</sup>Ivano-Frankivs'k National Medical University, Ivano-Frankivs'k, Ukraine

<sup>3</sup>Nicolaus Copernicus University, Torun, Poland [w.zukow@wp.pl](mailto:w.zukow@wp.pl)

<sup>4</sup>Ukrainian Scientific Research Institute for Medicine of Transport, Odesa, Ukraine  
[i.popovych@biph.kiev.ua](mailto:i.popovych@biph.kiev.ua)

### Abstract

**Introduction.** The influence of balneotherapy at the Truskavets' SPA on the blood pressure (BP) of his patients is still not in the focus of researchers. Therefore, we initiated the project "Neuroendocrine-immune and metabolic mechanisms of the effect of balneotherapy on BP".

**Materials and methods.** Under an observations were 34 males and 10 females (24-76 ys) patients chronic pyelonephritis and cholecystitis in the phase of remission. Testing was performed twice - on admission and after 7-10 days of standard balneotherapy. The main object of the study was office BP (tonometer "Omron M4-I", Netherlands). Simultaneously the parameters of hemodynamics (echocamera "Toshiba-140", Japan), HRV ("CardioLab+VRS", XAI Medica, Ukraine) and Hormones (ELISA) were determined.

**Results.** The optimal level of initial systolic BP (range 120÷129 mmHg) stated in 15,9% of cases, high norm (130÷139) in 15,9% too, arterial hypertension (AH) I (140÷160) – in 43,2%, AH II (over 160) in 11,4%, however, in 13,6% of cases the BP was lower than 120 mmHg. According to the results of individual changes of BPm, GPRV and CO, 4 clusters were formed. In 31.8% of patients Pm (mmHg) decreased from 108±3 by 7,4±0,9, in 31,8% from 99±2 by 2,7±0,7, in return in 25,0% increased from 97±3 by 5,7±1,1 and in 11,4% from 100±8 by 18,4±1,7. A significant decrease in Pm is due to a decrease in GPRV to a greater extent than an increase in CO. A moderate decrease in Pm is due to a decrease in CO to a greater extent than an increase in GPRV. A moderate increase in Pm is due to an increase in CO but not GPRV, and a significant increase in Pm is due to an increase in GPRV but not CO. Discriminant analysis revealed that the characteristic feature of the first cluster is the maximum for the sample reduction of testosterone and LFnu and stable entropy of HRV. The second cluster is characterized by the maximum for sample increase in levels of TP HRV, SDNN, Aldosterone and Cortisol and stable level of Triiodothyronine, the third by the maximum increase in calcitonin and LFnu, the fourth by the minimum decrease in testosterone and the maximum decrease in parathyroid activity. The accuracy of the classification is 100%.

**Conclusion.** The variety of reactions of BP and hemodynamics to balneotherapy is caused by a variety of reactions of autonomic and endocrine systems.