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**Odmienności w układzie sercowo-naczyniowym u pacjentek z  
pierwotnym zapaleniem dróg żółciowych (PBC).**

**Rozprawa na stopień doktora nauk medycznych i nauk o zdrowiu  
w dyscyplinie nauki medyczne**

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Obrona rozprawy doktorskiej przed Radą Dyscypliny Nauk Medycznych  
Warszawskiego Uniwersytetu Medycznego

Warszawa 2022r.

## SUMMARY

### **Variation in cardiovascular system in primary biliary cholangitis (PBC) patients.**

Background: Primary biliary cholangitis (PBC) is a chronic, autoimmune liver disease causing destruction of the small intralobular bile ducts in the liver. PBC patients can also develop extrahepatic manifestations, mostly related to skin, nervous system and laboratory abnormalities. Cardiac involvement is inconsistent in PBC studies despite the high levels of serum lipids. The treatment with ursodeoxycholic acid (UDCA) caused that many patients with early-stage PBC may have a normal life expectancy and therefore the cardiovascular complications can develop. This correlation is not well proved and described in literature.

Purpose: The purpose of the study was to assess cardiac morphology and cardiovascular function in patients with PBC and in control subjects using echocardiographic indices, impedance cardiography and non-invasive autonomic assessment.

Methods: 52 female patients with PBC and 44 healthy females, matched for age ( $54.5 \pm 8.7$  years and  $51 \pm 8.3$  years respectively,  $p = 0.064$ ) were investigated. Comparison was made between 38 subjects from PBC group without ESLD and 44 healthy subjects. TTE study was performed and analysis of left ventricular (LV) global longitudinal strain (GLS) and myocardial work was performed. Moreover, impedance cardiography was carried out and parameters such as CO, CI, SV, SI, TPR, TRRI, EDI, IC, LVET and TFC were assessed. Analysis of autonomic function was made using BRS, HRV and BPV. Additionally routine laboratory tests were taken including lipid profile.

Results: Systolic blood pressure (SBP) differed between PBC and control group ( $128 \pm 17$  mmHg and  $116 \pm 11$  mmHg respectively,  $p = 0.006$ ), while diastolic blood pressure (DBP) ( $78 \pm 10$  mmHg and  $76 \pm 10$  mmHg,  $p = 0.2$ ) and heart rate (HR) ( $73 \pm 12$  bpm and  $70 \pm 8$  bpm,  $p = 0.32$ ) did not. PBC group had increased diameter of cardiac chambers when adjusted for body surface area (BSA), including left atrium (LA/BSA) and right ventricle (RV/BSA), as well as left ventricular mass (LWMI) and relative wall thickness (RWT) with no difference in left ventricular end diastolic diameter (LVEDD/BSA). LV ejection fraction (EF) measured by Simpson method was increased in PBC group. Analysis between healthy subjects and PBC patients without cirrhosis revealed similar outcomes. LV diastolic function parameters (E/A, E/e') differed in patients with PBC when compared with controls, nevertheless there were no criteria of diastolic dysfunction. LV GLS indices (GLSAVG, GLSLAX, GLS4C, GLS2C) were significantly higher

in PBC group, as well as global myocardial work indexes: global myocardial work (GWI) and global constructive work (GCW). Global work efficiency (GWE) and global wasted work (GWW) indexes were not different. Non-invasive autonomic assessment showed lower heart rate variability (HRV) as well as lower blood pressure variability (BPV) in patients with PBC.

Conclusion: Our study shows that PBC patients are characterized by remodeling and functional changes of the heart that could imply hyperkinetic circulation even before the development of cirrhosis, what was demonstrated after additional analysis with PBC group without cirrhosis. Moreover PBC patients have impaired autonomic function.