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Grading the Severity of Atherosclerosis in Obstructive Sleep Apnea

S. Cofta¹, H. Winiarska¹, A. Płóciniczak³, L. Bielawska², A. Brożek³, T. Piorunek¹, M. Kostrzewska¹, E. Wysocka²

¹Department of Respiratory Medicine, Allergology and Pulmonary Oncology
Poznan University of Medical Sciences, Szamarzewskiego 84 Str, 60-569 Poznań, Poland.
Presenting author: winiarskahanna@gmail.com

²Department of Laboratory Diagnostics, Poznan University of Medical Sciences, Szamarzewskiego 84 Str, 60-569 Poznań, Poland

³Department of Clinical Biochemistry and Laboratory Medicine, Poznan University of Medical Sciences, [Rokietnicka 8 Str](#), 60-780 Poznań, Poland,

Background. Increased cardiovascular risk is recognized in obstructive sleep apnea (OSA). Adhesive molecules (i.e. selectins) are involved in the development of atherosclerosis, as well as oxidative stress. The current classification of sleep apnea syndrome is based on apnea/hypopnea index (AHI) to recognize mild, moderate and severe stage of the disease. The aim of the study was to assess the diagnostic meaning of plasma concentrations: endothelial, leucocyte and platelet (E, L, P-selectins) and oxidative stress markers in different stage-OSA patients.

Methods: OSA-suspected non-smoking Caucasians, males aged 34-64, centrally obese with BMI 25-35 kg/m² and neither acute nor chronic disease, underwent clinical examination and were qualified for polysomnography (EMBLA) and oral glucose tolerance test (OGTT). In normal glucose tolerance persons AHI was used to diagnose no disturbances (OSA-0: n=24, AHI<5), mild (OSA-1: n=24, AHI 5-15), moderate (OSA-2: n=24, AHI 16-30) and severe (OSA-3: n=28, AHI>30) pathology. The concentrations of E, L, P-selectins were measured by ELISA method. Total antioxidant status TAS (Randox) and thiobarbituric acid-reacting substances TBARS (Sigma reagents) reflecting lipid peroxides, were determined spectrophotometrically. Attention was drawn to the large spread of concentrations of selectins and TBARS in plasma of OSA-3 subjects. Due to this fact patients were divided into: OSA-3A (AHI 31-50) and OSA-3B (AHI>50) groups.

Results: Three selectins and TBARS values increased and TAS decreased from OSA-0 to OSA-3. The differences became more evident for E,P-selectin and TBARS, when OSA-3A and OSA-3B subgroups were established. Receiver operating characteristics (ROC) for the investigated parameters in all groups of OSA patients were performed. ROC curve analysis showed that of investigated parameters TBARS and E-selectin were excellent to differentiate between OSA-3A and OSA-3B patients (AUC: 0.980 and 0.974, respectively). TBARS >8.42 µmol/l with 100% sensitivity and 85.7% specificity, and E-selectin >33.9 ng/ml with 85.7% sensitivity and 100% specificity, distinguished two subgroups of severe sleep apnea.

Conclusion: Markers of endothelium dysfunction (E-selectin) and oxidative stress (TBARS) might be highly favourable to categorize metabolic threat of OSA. The markers complement each other in the assessment of cardiovascular risk related to OSA pathology.