

# ASSOCIATION BETWEEN THE TRIGLICERIDE-GLUCOSE INDEX AND OBSTRUCTIVE SLEEP APNEA SEVERITY IN ATRIAL FIBRILLATION PATIENTS WITH CO-EXISTING OBSTRUCTIVE SLEEP APNEA

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**Background.** Atrial fibrillation (AFib) is a common disease worldwide (estimated global prevalence is near 46.3 million), and obstructive sleep apnea (OSA) is one of the independent risk factors for the development and progression of this arrhythmia [1].

Metabolic changes in OSA are diverse, and the contribution of insulin resistance to the pathogenesis of OSA is undeniable [2]. Insulin resistance is one of the most important pathophysiological abnormalities, indicating link with chronic intermittent hypoxia and causing progression and an unfavorable outcome in OSA patients. Some clinical studies demonstrated positive effect of continuous positive pressure ventilation to treat insulin resistance in OSA patients [2]. In patients with AFib, metabolic dysfunction such as insulin resistance may enhance disease progression through mechanisms involving inflammatory activation, oxidative stress, electrical and structural cardiovascular remodeling [3].

In recent years, studies have shown that the triglyceride glucose (TyG) index, is useful novel biomarker for evaluating insulin resistance [1, 3-5]. It was reported that the degree of TyG index change corresponds to the severity of respiratory disorders [4]. Furthermore, the TyG index is associated with adverse cardiovascular events [1, 5]. However, no study has attempted to investigate the association of the TyG index with OSA severity in the AFib population.

**The aim of the study** – to evaluate the association between the triglyceride-glucose index and obstructive sleep apnea severity in atrial fibrillation patients with comorbid OSA.

**Research methods.** The study enrolled 143 patients with AFib, comprising 101 (70,63%) males and 42 (29,37%) females (average age 55,68±8,12 years). Overnight cardiorespiratory monitoring was performed using the «Cardiotechnika-04» system and software complex (INKART, Russia) following standardized protocols. After confirming OSA diagnosis, 101 participants were stratified into mild OSA ((AHI ≥5 – <15); n=29), moderate OSA ((AHI ≥15 – <30); n=40), severe OSA ((AHI ≥30); n=32) groups. Venous blood specimens were obtained in all patients following ≥12 hours of nocturnal fasting for clinical assessment, quantifying: glucose level, lipid metabolism profile (total cholesterol, triglyceride, high-density lipoproteins, low-density lipoproteins). The TyG index was calculated as  $\ln$

[fasting triglycerides (mg/dL) × glucose (mg/dL)/2]. All statistical analyses were performed using Statistica 10.0 (Start Soft Inc., USA).

**Results and discussion.** OSA group had apnea-hypopnea index (AHI) level of 22 (13;33), and level of desaturation index 14 (4; 22), and non-OSA patients had AHI level of 4 (2; 4) and level of desaturation index 0 (0; 2) ( $p<0,001$ ). The median TyG index of AFib patients with OSA was higher than in non-OSA patients (4,158 (4,009; 4,379) vs 3,699 (3,378; 3,93) respectively,  $p<0,001$ ). In paroxysmal AFib patients the TyG index was significantly lower than in persistent/permanent types: in paroxysmal AFib patients – 3,96 (3,7; 4,15), in persistent AFib patients – 4,16 (3,94; 5,09), in permanent AFib patients – 4,23 (4,01; 4,36) ( $p=0,001$ ). There were significant difference between the subgroups of mild OSA, moderate and severe OSA groups in the level of the TyG index (3,99 (3,87; 4,099) vs 4,174 (4,034; 4,292) vs 4,491 (4,179; 5,319),  $p<0,001$ ). The studying groups had no differences in body mass index: 27,99 (25,62; 32,1)  $\text{kg/m}^2$  in non-OSA patients and 31,64 (29,32; 34,95)  $\text{kg/m}^2$  in OSA-patients ( $p>0,05$ ). There was statistical correlation between the TyG index and AHI ( $R=0,75$ ,  $p<0,001$ ), desaturation index ( $R=0,71$ ,  $p<0,001$ ) and  $\text{minSpO}_2$  ( $R=-0,55$ ,  $p<0,001$ ). There was also positive correlation between the TyG index and body mass index ( $R=0,32$ ;  $p=0,0001$ ). There wasn't any correlation between the TyG index and age ( $R=0,038$ ;  $p>0,05$ ). Multivariate linear regression analysis with the exception showed link between levels of the TyG index and AHI ( $\beta=0,734$ ;  $F=165,08$ ;  $R^2_{\text{adj}}=0,536$ ;  $p<0,001$ ).

**Conclusion.** Presence of OSA in AFib patients is associated with increased TyG index. The TyG index can be an independent predictor of the severity of OSA.

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