World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:16, No:01, 2022

Possible Mechanism of DM2 Development in OSA Patients Mediated via Rev-Erb-Alpha and NPAS2 Proteins

Authors : Filip Franciszek Karuga, Szymon Turkiewicz, Marta Ditmer, Marcin Sochal, Piotr Białasiewicz, Agata Gabryelska

Abstract : Circadian rhythm, an internal coordinator of physiological processes is composed of a set of semi-autonomous clocks. Clocks are regulated through the expression of circadian clock genes which form feedback loops, creating an oscillator. The primary loop consists of activators: CLOCK, BMAL1 and repressors: CRY, PER. CLOCK can be substituted by the Neuronal PAS Domain Protein 2 (NPAS2). Orphan nuclear receptor (REV-ERB-α) is a component of the secondary major loop, modulating the expression of BMAL1. Circadian clocks might be disrupted by the obstructive sleep apnea (OSA), which has also been associated with type II diabetes mellitus (DM2). Interestingly, studies suggest that dysregulation of NPAS2 and REV-ERB-α might contribute to the pathophysiology of DM2 as well. The goal of our study was to examine the role of NPAS2 and REV-ERB-α in DM2 in OSA patients. After examination of the clinical data, all participants underwent polysomnography (PSG) to assess their apnea-hypopnea index (AHI). Based on the acquired data participants were assigned to one of 3 groups: OSA (AHI>30, no DM2; n=17 for NPAS2 and 34 for REV-ERB-α), DM2 (AHI>30 + DM2; n=7 for NPAS2 and 15 for REV-ERB-α) and control group (AHI<5, no DM2; n=16 for NPAS2 and 31 for REV-ERB-α). ELISA immunoassay was performed to assess the serum protein level of REV-ERB-α and NPAS2. The only statistically significant difference between groups was observed in NPAS2 protein level (p=0.037). Post-hoc analysis showed significant differences between the OSA and the control group (p=0.017). AHI and NPAS2 level was significantly correlated (r=-0.478, p=0.002) in all groups. A significant correlation was observed between the REV-ERB-α level and sleep efficiency (r=0.617, p=0.005) as well as sleep maintenance efficiency (r=0.645, p=0.003) in the OSA group. We conclude, that NPAS2 is associated with OSA severity and might contribute to metabolic sequelae of this disease. REV-ERB-α on the other hand can influence sleep continuity and efficiency.

Keywords : OSA, diabetes mellitus, endocrinology, chronobiology
Conference Title : ICCED 2022 : International Conference on Classical Endocrine Diseases
Conference Location : Dubai, United Arab Emirates
Conference Dates : January 28-29, 2022