Protective effect of resveratrol against chronic intermittent hypoxia-induced spatial memory deficits, hippocampal oxidative DNA damage and increased p47Phox NADPH oxidase expression in young rats

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Abstract:

Long-term intermittent hypoxia (IH) is a characteristic hallmark of obstructive sleep apnea (OSA) and causes most of the neurological aspects of OSA, such as spatial memory and learning deficits. These deficits are accompanied by an increase in oxidative stress and inflammation in brain areas involved in cognition, such as the hippocampus, particularly in children. Resveratrol is a natural polyphenolic compound with potent antioxidant, anti-inflammatory and neuroprotective properties. AIM: The aim of this work is to study the possible protective effect of resveratrol against IH-induced neurobehavioral deficits and to investigate the possible mechanism of this protective effect in the young rat model of OSA. METHODS: The effect of resveratrol (5 and 10mg/kg, orally) on anxiety, spatial memory and learning deficits in young rats exposed to IH for 6 weeks and the corresponding biochemical changes were studied. RESULTS: Resveratrol attenuated IH-induced anxiety and spatial memory deficits, as indicated by the elevated plus maze and Morris water maze tests, respectively, in a dose-dependent manner. In addition, resveratrol antagonized IH-induced increases in hippocampal glutamate, TBARS and 8-OHdG levels and p47Phox expression and decreases in GSH levels and GSH-Px activity in the hippocampus of IH-exposed young rats. CONCLUSION: Resveratrol ameliorates IH-induced anxiety and spatial learning deficits through multiple beneficial effects on hippocampal oxidative pathways that involve decreased expression of the p47Phox subunit of NADPH oxidase. Hence, the potential therapeutic role of resveratrol in OSA may be utilized in the near future and deserves further exploration.

Keywords:

DNA damage; Intermittent hypoxia; NADPH oxidase; Resveratrol; Sleep apnea

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