

# Sleep architecture and obstructive sleep apnea in obese children with and without metabolic syndrome: a case control study

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## Abstract

*Purpose* Obesity and biochemical parameters of metabolic disorders are both closely related to obstructive sleep apnea (OSA). The aim of this study was to compare sleep architecture and OSA in obese children with and without metabolic syndrome.

*Methods* Forty-two children with metabolic syndrome were selected as case group and 38 children without metabolic syndrome were matched for age, sex, and BMI as control group. The standardized Persian version of bedtime problems, excessive daytime sleepiness, awakenings during the night, regularity and duration of sleep, snoring (BEARS) and Children's Sleep Habits Questionnaires were completed, and polysomnography (PSG) was performed for all study subjects. Scoring was performed using the manual of American Academy of Sleep Medicine for children. Data were analyzed using chi-square test, T test, Mann–Whitney U test, and logistic regression analysis.

*Results* Non-rapid eye movement (NREM) sleep and N1 stage in the case group were significantly longer than the control group, while REM sleep was significantly shorter. Waking after sleep onset (WASO) was significantly different between two groups. Severe OSA was more frequent in the control group. Multivariate logistic regression analysis showed that severe OSA (OR 21.478, 95 % CI 2.160– 213.600; P = 0.009) and REM sleep (OR 0.856, 95 % CI 0.737–0.994; P = 0.041) had independent association with metabolic syndrome.

*Conclusions* Obese children with metabolic syndrome had increased WASO, N1 sleep stage, and severe OSA. But the results regarding sleep architecture are most likely a direct result of OSA severity. More longitudinal studies are needed to confirm the association of metabolic syndrome and OSA.

**Keywords** Metabolic syndromeX . Obesity . Obstructive sleep apnea . Sleep stages . Polysomnography

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