1042.G

Long-Term Impact of Snoring During Early Childhood on Academic Performance in Middle School

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Introduction: Obstructive sleep apnea in young children is associated with adverse outcomes as they relate to learning during 1st grade. Indeed, among 297 poorly performing 1st graders in public schools, there was an estimated 6-8 fold increase in the number of children who had symptoms and nighttime-associated gas exchange abnormalities compatible with obstructive sleep apnea syndrome (OSAS; 1). In those who had OSAS, treatment led to amelioration of school performance.[1] However, after the 2-6 year old peak in the frequency of adenotonsillar enlargement, there appears to be a regression in sleep-related breathing symptoms, as well as a reduction in the prevalence of snoring and possibly OSAS. However, the long-term impact of snoring and OSAS remains unknown. We hypothesized that lower school performances would be more likely to occur among children who had a history of snoring during their early years of life.

Methods: Questionnaires were mailed to 2,000 7th and 8th graders attending public middle schools who were ranked in their class either in the top 25% (n=1,003; HP) or bottom 25% of their class (n=998; LP). The questionnaire specifically inquired about snoring frequency and severity at ages 2-6, as well as whether surgical removal of tonsils and adenoids had occurred at any time due to snoring or to recurrent throat infections. In addition, the cumulative average school grades were also requested.

Results: Of the 2,001 questionnaires, 114 were returned due to wrong address; 679 parents responded to the questionnaire and correctly filled out all the pertinent questions (36% return rate). An additional 122 responded with many items missing, and are currently being contacted by telephone to improve response rates. Of the responders, 336 were in the LP group and 343 in the HP group (p-NS). Similarly, there were 51.7% girls in LP and 50.9% girls in HP (p-NS). Frequent snoring (> 3 times/week) during early childhood was present in 38 LP children (11.3%) while it was reported in only 15 HP (4.4%) (OR [odds ratio]: 2.79; CI: 1.45-5.42; p<0.001). Furthermore, 10 LP and 3 HP children underwent adenotonsillectomy for their snoring (OR: 3.48; CI: 0.88-16.05; p<0.04).

Conclusions: Low performers in middle school were more likely to have snored and require adenotonsillectomy for snoring than high performing schoolmates. If further confirmed in a larger cohort, these findings support the concept that reversibility of OSAS-induced neurocognitive morbidity is only partial or that a "learning debt" may develop during early childhood and hamper subsequent learning performance.

References:
(1) Gozal D. Sleep-disordered breathing and school performance in children. Pediatrics 1998; 102:616-620.

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1688.G

Daytime REM Sleep in Adolescents

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Introduction: A previous study (Carskadon et al., 1998) of US high school students with school start time at 0720 showed an unexpectedly high incidence (48%) of REM sleep on daytime multiple sleep latency tests (MSLT), related to onset phase of melatonin, which was 2146 in students with daytime REM and 2036 in those without. The present study examines daytime REM sleep in a separate adolescent sample.

Methods: Participants were 13 boys, 18 girls (ages 14 to 18) selected from 133 screened with one week of actigraphy and self and parent report forms. Participants were excluded for medical or psychiatric illness, personal or family history of major sleep disorder, or use of prescribed psychoactive medications. Eligible students in upper and lower quartiles of actigraphically-estimated school-night sleep were invited for a 16-week study with actigraphy, sleep diaries, weekly structured interviews, and two laboratory visits (4-6 weeks apart), including morning and evening saliva collection, overnight sleep on school-night schedule, and MSLT at 0830, 1030, 1230, and 1430.

Results: 28 students completed the first in-lab session, 27 the second, and 24 both. Daytime REM was identified in 9 (32%) in Session 1 and 12 (44%) in Session 2. Mean daily MSLT was shorter ($p < .05$) in those with daytime REM (Session 1 = 6.6±4.0 min.; Session 2 = 6.8±3.7 min.) than those without daytime REM (Session 1 = 10.6±4.9 min.; Session 2 = 10.6±5.5 min.). REM episodes did not vary with time of day. For Session 1, salivary melatonin offset phase was significantly ($p<.05$) later in those with daytime REM than in those without daytime REM (0805±69 min. vs. 0709±26 min.); melatonin onset phase did not distinguish groups in Session 1 (2117±78 min. for REM group vs. 2039±64 for no-REM group). Neither melatonin onset (2047±60 vs. 2042±58) nor melatonin offset (0719±54 vs. 0708±45) phases distinguished groups in Session 2. Pre-screen actigraphically-estimated school-night sleep in Session 1 showed significantly ($p=.01$) lower sleep for those with daytime REM (362±47 min.) than those without REM (415±48 min.). A similar trend did not achieve statistical significance for Session 2. Mean daily MSLT and melatonin onset and offset did not differ significantly across sessions and showed strong correlations (MSLT $r = .63$, $p =.001$; melatonin onset $r = .87$, $p<.001$; melatonin offset $r = .88$, $p<.001$), indicating reliability.

Conclusions: These data support previous findings showing a high incidence of daytime REM sleep in adolescents. Morning distribution of REM sleep episodes did not replicate, nor did the association of REM with melatonin onset, although melatonin offset in Session 1 was related to REM sleep. Chronically reduced sleep in the present sample may have influenced daytime REM propensity, perhaps in association with REM deprivation. Further analyses on an expanded sample will examine these possibilities. These data indicate troublesome levels of daytime sleepiness and increased REM propensity in many adolescents.

References:
(1) Carskadon MA, Wolfson AR, Acebo C, Tzischinsky O, Seifer R. Adolescent sleep patterns, circadian timing, and sleepiness at a transition to early school days. Sleep 1998;21:871-81.

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