Differences in Overnight Polysomnography Scores Using the Adult and Pediatric Criteria for Respiratory Events in Adolescents

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Study Objectives: There was no consensus in the 2007 American Academy of Sleep Medicine scoring manual on whether pediatric or adult respiratory criteria should be used in adolescents due to lack of data. Our objective was to compare pediatric and adult criteria in adolescents referred for obstructive sleep apnea (OSA). We hypothesized that pediatric criteria would capture more respiratory events than adult criteria.

Design: Retrospective cross-sectional analysis.

Setting: Clinical sleep laboratory.

Participants: 101 subjects aged 13-18 years clinically referred for OSA.

Interventions: Overnight polysomnogram. Data were scored using both adult and pediatric AASM criteria. For adult criteria, data were scored using both AASM hypopnea rule A, defined by ≥ 4% desaturation, and B, defined by ≥ 3% desaturation or arousal.

Results: Median (range) apnea hypopnea index (AHI) by pediatric criteria was 1.7 events/hour (0–42.9). AHI using rule A was 0.4 (0–35.6); rule B, 1.4 (0–38.4). A higher pediatric AHI was associated with greater differences between pediatric and adult AHI using either rule A or B. There was no significant discordance in OSA classification comparing pediatric and adult criteria rule B (P = 0.3), but there was a significant rate of discordance classification comparing pediatric and adult criteria rule A (P < 0.001).

Conclusions: Either pediatric or adult criteria rule B can be used in adolescents as few subjects change diagnostic category between these 2 criteria. Use of adult rule A results in fewer children meeting criteria for OSA. Further research into the clinical relevance of the scoring metric in adolescents is warranted.

Keywords: Adolescent, apnea, hypopnea, obstructive events, respiratory events, scoring

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OBSTRUCTIVE SLEEP APNEA (OSA) IS A COMMON SLEEP DISORDER WITH A PREVALENCE OF 1% TO 2% AMONG CHILDREN.[1] IT IS A TREATABLE CONDITION which can affect growth, school performance, and cardiopulmonary health.[2] Polysomnography (PSG) is required for definitive diagnosis of suspected OSA in both children[3] and adults.[4,5] It is a useful tool that can identify respiratory events such as apneas and hypopneas, as well as resulting desaturation, arousal, and hypercarbia.[6] Because sleep disordered breathing in childhood has both a different epidemiology and pathophysiology than in adulthood,[7-9] respiratory scoring criteria specifically for use in children have been developed and recently updated for use.[4,10]

Adolescents represent a unique population in medicine in their passage through a variety of dramatic biopsychosocial transitions from childhood to adulthood.[11] However, they have not been well represented in published studies of sleep disordered breathing and its associated pathophysiology. In fact, a consensus report from a national conference on pediatric sleep medicine in 2005 identified adolescent sleep as a research priority for the field.[12] As a group, adolescents have typically been lumped with prepubertal children or young adults, but not consistently considered separately.[13,14] It makes intuitive sense, however, that adolescence would be the time of transition between childhood and adult respiratory physiology.

The American Academy of Sleep Medicine recommends specific pediatric rules for scoring respiratory events in children aged < 13 years. Pediatric respiratory criteria were designed taking into account differences in the pathophysiology and epidemiology of obstructive sleep apnea between children and adults. Adolescents aged 13-18 years fall in a gray zone. They are in a time of transition between childhood and adulthood, as is most obvious in their pubertal development but which is manifested throughout their physiology. They may behave in some ways more like adults in terms of their risk factors for obstructive sleep apnea.[15] The American Academy of Sleep Medicine (AASM), in their updated scoring manual, admits that there are inadequate data to determine whether to use adult or pediatric scoring criteria in the adolescent age group. According to the AASM, "Empiric observations would suggest that adult criteria could be used in some older children."[4,10] New AASM guidelines for pediatric and adult respiratory scoring of polysomnographic data were published in 2007, so literature on the use of these guidelines is still emerging.[16,17]

We hypothesized that pediatric criteria would capture more respiratory events than adult criteria. We therefore evaluated the differences resulting from applying adult and pediatric respiratory criteria to polysomnograms performed on adolescents who were clinically referred for evaluation of suspected obstructive sleep apnea in order to assess the impact of use of different scoring criteria in this population.

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METHODS

Study Subjects

Subjects consisted of consecutive adolescents aged 13-18 years who underwent overnight polysomnography at a pediatric sleep laboratory for evaluation of obstructive sleep apnea. Subjects were drawn from the period between 4/1/2007 and 2/28/2008. Subjects with common comorbidities of childhood OSA (asthma, sickle cell disease, and Down syndrome) were also included. Exclusion criteria included suspected narcolepsy, presence of a tracheostomy, and use of interventions such as use of continuous or bilevel positive airway pressure, mechanical ventilation, or supplemental oxygen. Overnight polysomnograms were excluded if performed as part of another research study. They were also excluded if subjects achieved < 5 h total sleep time during their polysomnographic study. Five hours was chosen arbitrarily as a minimum due to concerns about the adequacy of shorter studies for evaluation of sleep disordered breathing. The study was approved by the Institutional Review Board of The Children's Hospital of Philadelphia.

Subjects were referred to the sleep laboratory from a variety of sources, including the Sleep Center at The Children's Hospital of Philadelphia, the Divisions of Pediatric Pulmonology, Otolaryngology and Neurology at The Children's Hospital of Philadelphia, and primary care providers in the community.

Polysomnography

Polysomnographic data were digitally recorded using a Rembrandt polysomnography system (Embla, Broomfield, CO). The parameters recorded included the following: electroencephalography (C3/A2, C4/A1, O1/A2, O2/A1); left and right electrooculogram; submental electromyogram; bilateral tibial electromyogram; electrocardiogram; oronasal airflow with 3-pronged thermistor; nasal pressure with pressure transducer; rib cage and abdominal wall motion via respiratory impedance plethysmography; and end-tidal capnometry. Arterial oxygen saturation (SpO_2) with pulse waveform was also recorded. A subset of the subjects whose studies were performed following the adoption of American Academy of Sleep Medicine (AASM) guidelines had additional EEG leads (F3/M2, F4/M1).[4] All subjects were recorded on digital video during their studies.

Studies had all been scored on a clinical basis using AASM pediatric criteria. For the purpose of this research study, we rescored all studies using adult respiratory scoring criteria. In this way, each study was scored using 3 sets of respiratory criteria: pediatric, adult using hypopnea rule A, and adult using hypopnea rule B. We elected not to score respiratory effort related arousals (RERAs), which are optional in the guidelines. Sleep architecture and arousals from sleep were scored using the AASM criteria,[4] which are the same for both the pediatric (older than infancy) and adult age groups. All studies were reviewed and rescored manually by a single author (JA).

Apnea hypopnea index (AHI) was the outcome measure for this study, and was defined as the number of obstructive apneas (including mixed apneas) plus hypopneas, divided by the subject's total sleep time. This yielded a rate of obstructive respiratory events per hour of sleep. We chose to use an AHI cutoff > 1.5 events per hour as diagnostic for OSA, as this value is commonly used in pediatrics based on normative data in children.[14,18-20] In addition, data were reanalyzed using the commonly-used adult cutoff of > 5 events per hour.

Criteria for respiratory events are similar for adults and children, with some significant differences.[4] Table 1 summarizes both pediatric and adult criteria. All apneas require a drop ≥ 90% in peak thermal sensor excursion for ≥ 90% of the duration of the event. Obstructive apneas further require continued or increased respiratory effort. However, for adults, the duration required to score an obstructive apnea is ≥ 10 sec, while for children, the duration is ≥ 2 missed breaths. Mixed apneas consist of both central and obstructive components. Central sleep apneas are associated with absent respiratory effort for the duration of the event. For adults, the duration required to score a central apnea is again ≥ 10 sec, while in children it can be either ≥ 20 sec or ≥ 2 missed breaths if associated with an arousal, awakening, or ≥ 3% desaturation.[4]

There are two separate hypopnea criteria for adults, one of which parallels the criteria for children. Full details of all hypopnea criteria are provided in Table 1. Hypopnea rule A for adults requires association with ≥ 4% oxygen desaturation. Hypopnea rule B for adults requires an arousal, awakening, or ≥ 3% oxygen desaturation. Again for adults, the duration required to score a hypopnea is ≥ 10 sec for either criterion. As with pediatric obstructive apnea, a pediatric hypopnea is required to have a minimum duration of 2 missed breaths. Criteria for pediatric hypopnea are identical to those for adult hypopnea rule B except for the required duration of the event. The scoring of respiratory effort related arousals (RERAs) is optional for both children and adults.

Respiratory rate during REM sleep was calculated by counting the number of breaths occurring during a randomly selected period consisting of 2 consecutive 30-sec epochs from the last REM period of the study that was ≥ 8 epochs in length. Respiratory rate during N3 sleep was calculated by counting the number of breaths occurring during a randomly selected period consisting of 2 consecutive 30-sec epochs from the last N3 period in the study that was greater than about 8 epochs in length.

Statistical Analysis

Statistical analysis was performed using Stata 10.0 (StataCorp, College Station, TX). A P-value < 0.05 was used as the criterion for significance. Subject characteristics were described in terms of standard descriptive summaries (e.g., median values and ranges for continuous variables such as age and percentages for categorical variables such as gender).

The primary objective was the comparison of different sets of scoring criteria, none of which could be considered the gold standard for this population. To describe the differences, Bland-Altman plots were used to compare the results of scoring with adult respiratory event criteria using the 2 different accepted definitions of hypopneas, versus pediatric respiratory event criteria.[21,22] A Bland-Altman plot is a statistical method for evaluating agreement between 2 methods, neither of which is considered a gold standard. It graphs the difference between the 2 scoring methods versus their mean. If differences are normally distributed, around 95% of their values will fall between the overall mean of the differences plus or minus 2 standard deviations of those differences, called the limits of agreement.[23]

In addition, McNemar tests were used to examine rates of reclassification of subjects as having OSA using adult criteria,

Table 1—Description of respiratory rules for scoring obstructive events

	Pediatric	Adult
Obstructive apnea	• Drop in thermal sensor amplitude by ≥ 90% baseline • Duration ≥ 2 missed breaths • ≥ 90% duration meets amplitude reduction criteria • Continued or increased inspiratory effort during reduced airflow	• Drop in thermal sensor amplitude by ≥ 90% baseline • Duration ≥ 10 sec • ≥ 90% duration meets amplitude criteria • Continued or increased inspiratory effort during absent airflow
Central apnea	• Drop in thermal sensor amplitude by ≥ 90% baseline • **EITHER** duration ≥ 20 sec **OR** ≥ 2 missed breaths and associated with arousal, awakening or ≥ 3% desaturation • Absent inspiratory effort	• Drop in thermal sensor amplitude by ≥ 90% baseline • Duration ≥ 10 sec • ≥ 90% duration meets amplitude criteria • Absent inspiratory effort during absent airflow
Mixed apnea	• Drop in thermal sensor amplitude by ≥ 90% baseline • Duration ≥ 2 missed breaths • ≥ 90% duration meets amplitude reduction criteria • Absent inspiratory effort initially, then resumption of effort during latter part of event	• Drop in thermal sensor amplitude by ≥ 90% baseline • Duration ≥ 10 sec • ≥ 90% duration meets amplitude criteria • Absent inspiratory effort initially, then resumption of effort during latter part of event
Hypopnea	• Drop in nasal air pressure transducer amplitude by ≥ 50% • Duration ≥ 2 missed breaths • ≥ 90% of duration meets amplitude criteria • Associated with arousal, awakening or ≥ 3% desaturation	**HYPOPNEA A** • Drop in nasal air pressure transducer amplitude by ≥ 30% baseline • Duration ≥ 10 sec • Associated with ≥ 4% desaturation • ≥ 90% of duration meets amplitude criteria **HYPOPNEA B** • Drop in nasal air pressure transducer amplitude by ≥ 50% baseline • Duration ≥ 10 sec • Associated with ≥ 3% desaturation or arousal • ≥ 90% of duration meets amplitude criteria
RERA	• Duration ≥ 2 missed breaths • Flattening of nasal air pressure transducer waveform • Increased work of breathing • Sequence leads to arousal • Drop in amplitude < 50%	• Duration ≥ 10 sec • Flattening of nasal air pressure transducer waveform or increased respiratory effort in sequence of breaths leading to arousal • Does not meet criteria for apnea or hypopnea

considering each of the 2 hypopnea definitions separately, versus pediatric criteria.

Finally, multivariate regression modeling was performed to evaluate potential predictors of the magnitude of the differences between AHIs scored by pediatric versus adult criteria in this cohort.

RESULTS

Study Group

Overnight polysomnograms were initially reviewed for 102 adolescents from the specified time period. Using pediatric criteria, the range of AHI was 0-167.7 events per hour. One extreme outlier had an AHI of 167.7 events per hour (9.1 standard deviations above the mean). This outlier was excluded from further analysis, for a total of 101 adolescents. Table 2 details their baseline characteristics. Table 3 summarizes their sleep architecture and other characteristics during sleep.

Table 2—Cohort characteristics

Number of subjects	101
Age (years)	15 (13-18)
Gender	69% male
Racial category	50% White, 40% Black, 11% other
BMI-Z score	1.3 (−3.5 to 3.2)
Asthma (N, %)	25 (25%)
Down syndrome (N, %)	7 (7%)
Sickle cell disease (N, %)	5 (5%)

Values are displayed as N (%), or median (range).

Respiratory Events

Table 4 provides the median and range for indices of obstructive and central respiratory events scored in this group of adolescents using pediatric and adult scoring criteria. As central events were very rare, they were not further analyzed. None of the subjects were deemed to have pathological central sleep apnea. After exclusion of the extreme outlier noted above, the AHI range was 0-42.9 events per hour. We performed subsequent analyses after excluding this outlier.

Figure 1 shows 2 Bland Altman plots, one comparing adult respiratory criteria scoring using hypopnea rule A and pediatric criteria, the other comparing adult respiratory criteria scoring using hypopnea rule B and pediatric criteria. Measurements that are interchangeable should have a mean difference near zero.

Limits of agreement should be narrow enough that it would be acceptable for the different measurements being evaluated to produce results that differ by that magnitude. It was found that use of adult criteria with hypopnea rule A resulted in increasing differences between AHIs based on pediatric and adult scoring as average AHI increased. Mean difference between pediatric AHI and adult AHI with hypopnea rule A was 2.7; limits of agreement were −4.8 to 10.2. Use of adult criteria with hypopnea rule B also showed increasing differences between AHIs based on pediatric and adult scoring as average AHI increased, but to a lesser extent. Mean difference between pediatric AHI and adult AHI with hypopnea rule B was 0.6; limits of agreement were −1.6 to 2.7. In addition, limits of agreement became narrower when Bland-Altman plots were generated for pediatric AHI and adult AHI with hypopnea rule B when the pediatric AHI was limited to < 20 events per hour, suggesting the scoring criteria would yield more similar results for subjects with lower average AHIs (N = 95; mean difference, 0.4; limits of agreement, −0.8 to 1.5). Inclusion of the extreme outlier resulted in

Table 3—Sleep architecture

Total sleep time (hours)	6.8 (5-9.2)
Arousal index (N/hour)	10 (4-37)
Stage N1 (% TST)	8 (2-27)
Stage N2 (% TST)	51 (33-76)
Stage N3 (% TST)	20 (0-39)
Stage R (% TST)	19 (1-37)
Sleep efficiency (%)	84 (50-97)
Sleep latency (minutes)	23 (0-189)
REM latency (minutes)	140 (10-433)
Nadir SpO_2 (%)	91 (41-97)
Peak $ETCO_2$ (torr)	54 (42-100)
Respiratory rate, stage N3 (breaths/minute)	17 (12-28)
Respiratory rate, stage R (breaths/minute)	17 (11-31)
PLM index (N/hour)	0 (0-27)

Values are displayed as median (range). TST, total sleep time; PLM, periodic limb movement; SpO_2, arterial oxyhemoglobin saturation; $ETCO_2$, end-tidal carbon dioxide.

Table 4—Respiratory parameters

	Pediatric	Adult	
		Hypopnea A	Hypopnea B
Central apnea index (N/hour)	0.1 (0-2.2)	0.2 (0-5.3)	
Obstructive apnea index (N/hour)	0 (0-4.1)	0 (0-3.4)	
Hypopnea index (N/hour)	1.3 (0-37.9)	0.2 (0-31.2)	1.1 (0-34)
Apnea hypopnea index (N/hour)	1.7 (0-42.9)	0.4 (0-35.6)	1.4 (0-38.4)

Values are displayed as median (range).

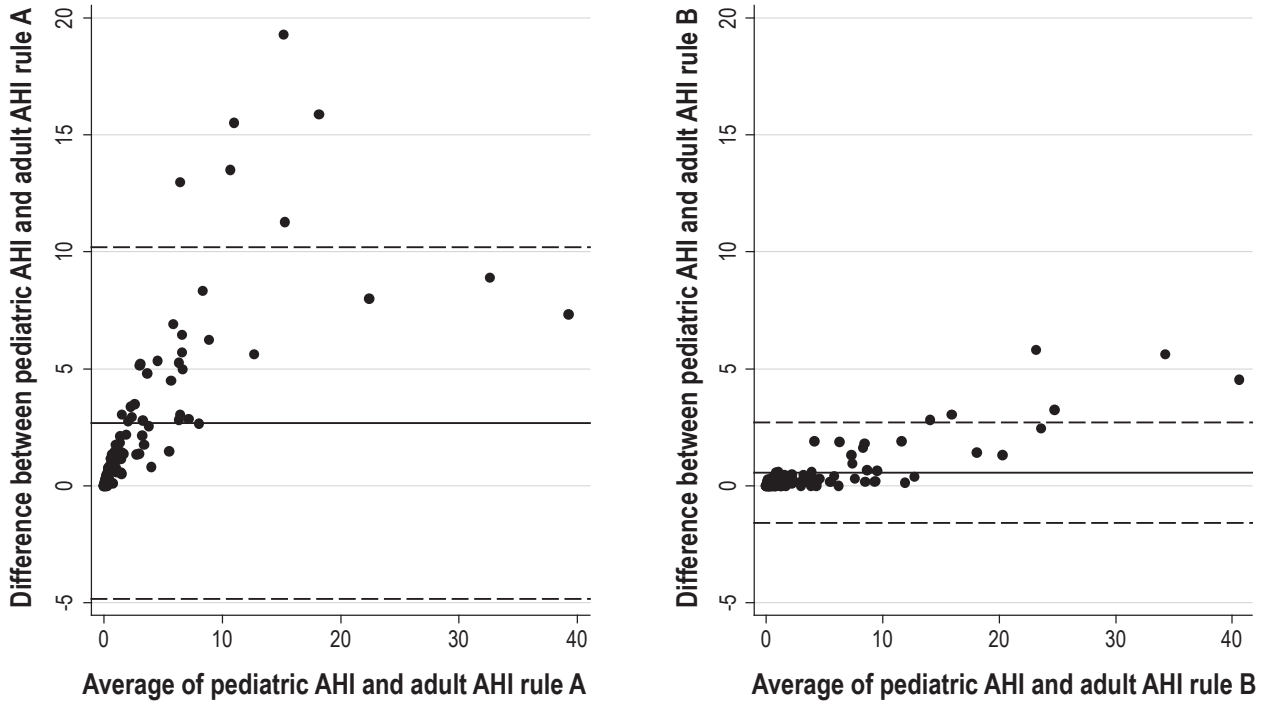

Figure 1—Bland Altman plots for pediatric vs. adult respiratory scoring criteria. Bland-Altman plots comparing pediatric AHI and adult AHI with hypopnea rule A or hypopnea rule B are shown. The solid lines indicate the means of the differences, and the dashed lines, 2 standard deviations above and below those means. See text for further details.

similar results but wider limits of agreement in the Bland Altman plots.

McNemar Tests

Table 5 shows the distribution of subjects in terms of a cutoff for diagnosis of OSA, first comparing adult respiratory criteria scoring using hypopnea rule A and pediatric criteria, then comparing adult respiratory criteria scoring using hypopnea rule B and pediatric criteria. An AHI > 1.5 events/hour was used as the cutoff for diagnosis of OSA. We found that 52 adolescents would have been classified as having OSA using pediatric versus 30 using adult criteria with hypopnea rule A ($P < 0.0001$), and 49 using adult criteria with hypopnea rule B ($P = 0.3$). Thus adult criteria using hypopnea rule A had a significant rate of discordant classification versus with pediatric criteria, whereas adult criteria using hypopnea rule B did not have a significant rate of discordant classification versus pediatric criteria. Similar results were obtained using the diagnostic criteria of AHI > 5 events/hour, such that 28 adolescents would have been classified as having OSA using pediatric versus 10 using adult criteria with hypopnea rule A ($P < 0.0001$), and 27 with adult criteria using hypopnea rule B ($P = 0.99$).

Multivariate Regression Analysis

The pediatric AHI definition has a shorter duration criterion then the adult AHI definitions. These definitions were chosen because young children have a higher respiratory rate than adults, but this may not be relevant to adolescents. Because a more rapid respiratory rate in children could be mediating the difference in AHIs, we analyzed the relation between respiratory rate and AHI. None of the correlation coefficients between the respiratory rate in slow wave sleep and pediatric AHI, adult AHI using hypopnea A, and adult AHI using hypopnea B were significant ($r = -0.02$, -0.05, and -0.03, respectively; all $P > 0.6$), indicating that respiratory rate did not account for the differences in AHIs.

Multivariate regression analysis of covariates contributing to the difference in AHI scores using pediatric versus adult criteria with either hypopnea rule A or B showed that higher pediatric AHI was significantly associated ($P < 0.001$) with larger differences between the AHIs (pediatric versus adult using hypopnea rule A, adjusted $R^2 = 0.7$; pediatric versus adult using hypopnea rule B, adjusted $R^2 = 0.8$). Age, race, and BMI z-scores were not predictive of differences between AHIs based on pediatric versus adult scoring criteria using either of the adult hypopnea rules. Use of obesity as a binary variable, defined as BMI at or above the 95th percentile (BMI z-score > 1.64),[24] also did not predict differences in AHIs. Down syndrome was significantly associated with greater differences between pediatric AHI and adult AHI using hypopnea rule A ($P = 0.03$).

The presence of asthma or sickle cell disease (Table 2) did not influence the degree of difference in AHI between pediatric and either version of the adult scoring criteria.

Table 5—McNemar tests for pediatric versus adult scoring criteria

A—Number of subjects changing OSA classification: pediatric vs. adult criteria hypopnea rule A.

	OSA, adult criteria	No OSA, adult criteria	Total
OSA, pediatric criteria	30	22	52
No OSA, pediatric criteria	0	49	49
	30	71	101

Use of pediatric criteria vs. adult criteria using hypopnea A resulted in a significant number of subjects changing classification from no OSA to OSA using a cutoff of 1.5 events/hour ($P < 0.0001$).

B—Number of subjects changing OSA classification: pediatric vs. adult criteria hypopnea rule B.

	OSA, adult criteria	No OSA, adult criteria	Total
OSA, pediatric criteria	49	3	52
No OSA, pediatric criteria	0	49	49
	49	52	101

Use of pediatric criteria vs. adult criteria using hypopnea B did not result in significant change in classification of subjects from no OSA to OSA using a cutoff of 1.5 events/h ($P = 0.3$).

DISCUSSION

Currently, the AASM provides three different sets of scoring rules that can be used for adolescents. This study showed that the application of pediatric and adult respiratory scoring criteria using hypopnea rule B resulted in calculation of similar AHIs in adolescents. However, application of adult respiratory scoring criteria using hypopnea rule A resulted in significantly different AHIs in classification with OSA compared with those obtained from pediatric scoring, which can result in differences in clinical decision making. These findings suggest that the current lack of recommendation for which set of criteria to use in this age group requires remediation.

Adolescents are seen frequently in sleep clinics, perhaps because of the rising prevalence of obesity in this age group. Obesity in childhood and adolescence is on the increase and has been termed an epidemic.[25,26] Obesity is a known risk factor for OSA and accounts for increasing numbers of young people with sleep disordered breathing.[27,28] In the past, a typical child with OSA was preschool age with large tonsils and perhaps failure to thrive; now pediatric OSA has become a disease with a bimodal distribution due to a second peak in adolescence.[26] Meanwhile, measurable deficits in language function in adolescents with OSA compared with their peers have been noted.[29] It has already been suggested that sleep may be of particular importance during periods of brain maturation.[30] Identification and treatment of adolescents at risk are therefore highly important.

Ultimately, the decision as to which criteria to use in scoring polysomnograms of adolescent patients should be based on the relationship between polysomnographic parameters and clinical outcomes. Perhaps surprisingly, this relationship has not yet been well defined. Further studies to quantify the best predictors of clinical significance are clearly needed.

Children typically have a more rapid respiratory rate than do adults. They also have a lower functional residual capacity, and so are more likely to desaturate with shorter respiratory events.

Thus even short events may be clinically significant. However, recent data suggest that the respiratory rate remains relatively stable over puberty.[31] This could explain why pediatric criteria and adult criteria using hypopnea rule B yielded such similar results, since the only difference between these criteria for obstructive events is duration.

Previous work by our group demonstrated that children and adolescents aged 8-18 years without symptoms of sleep disordered breathing had only rare respiratory events during polysomnography.[31] The difference between the median AHI for this group when calculated by pediatric versus adult criteria, while statistically significant, was too small to be clinically relevant. Thus, it was recommended that in the evaluation of typical older children or adolescents, either pediatric or adult scoring criteria were appropriate, consistent with the findings of the current study. Differences between scoring based on the two different adult hypopnea rules were not apparent, however, in the previous, asymptomatic group, possibly because of their low number of events at baseline. Similarly, Ruehland et al. recently showed that application of adult criteria with the different AASM hypopnea rules yielded different results, both statistically and clinically, from the Chicago criteria published in a 1999 consensus report,[32] and from each other.[16] In this retrospective review of previously scored polysomnograms of adults clinically referred for evaluation of OSA, adult criteria using hypopnea rule A identified the fewest subjects as having OSA compared with either the Chicago criteria, which identified the most subjects, or hypopnea rule B, which was intermediate.[16] Therefore, it is not surprising that a similar discrepancy occurred in the current cohort, in which pediatric criteria versus adult criteria using hypopnea rule A were significantly different, whereas pediatric criteria versus adult criteria using hypopnea rule B were not significantly different.

The identification of Down syndrome as a covariate affecting the magnitude of difference between results from use of the pediatric scoring criteria and the adult criteria using hypopnea rule A is an intriguing finding worthy of follow up. Although Down syndrome is a known risk factor for OSA, it is not clear why adolescents with Down syndrome would have greater differences between AHI as calculated by those scoring criteria than other adolescents.

OSA has been described previously as equally prevalent in both genders among children.[1] As with some other studies, our study group had a male predominance, but this study was not population based.[33] In fact, there are few population-based studies of OSA in adolescents. OSA is significantly more prevalent in adult men than women, at least until women reach the age of menopause, which has pointed to hormonal effects on vulnerability.[34] Further population based studies are needed to fill the gap in knowledge about the transitional period of adolescence.

Study Limitations

Tanner staging has been hypothesized to affect respiratory events. Tanner staging was not recorded for this group of clinically referred subjects, and therefore was not analyzed. However, it has been previously shown by this group that Tanner stage looked at independently of age is not associated with either dynamic function of the upper airways or occurrence of respiratory events in adolescents.[31,35]

Most pediatric sleep laboratories do not score RERAs, and we elected not to score them. However, they were very rarely observed in our patients.

Study scoring was performed using objective criteria based on the AASM rules. However, study scoring was not blinded to subjects' clinical histories, and the order in which studies were reviewed was not randomized.

Our research was based on clinically referred subjects with various medical conditions, including several children with multiple medically complex conditions. Use of this heterogeneous population, however, may provide greater external validity, particularly for a clinical pediatric sleep laboratory setting.

CONCLUSIONS

We conclude that pediatric and adult respiratory scoring criteria with hypopnea rule B may be used interchangeably with little difference in results. However, adult respiratory scoring criteria with hypopnea rule A yielded significantly different results in classification of OSA compared to pediatric scoring rules and cannot be used interchangeably with pediatric scoring rules. We therefore recommend that either pediatric scoring rules or adult criteria B rules be used for adolescents. Further research into the clinical relevance of the scoring metric in adolescents is warranted (i.e., which polysomnographic parameters predict clinical outcomes) in order to produce definitive recommendations on which respiratory scoring rules are most appropriate for clinical and research use.

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