2020

How adherent are obese children with sleep-disordered breathing on positive airway pressure therapy? COMMENT

S. V. Kothare
Zucker School of Medicine at Hofstra/Northwell

K. Kelly-Pieper
Zucker School of Medicine at Hofstra/Northwell

https://doi.org/10.5664/jcsm.8448

JCSM | Journal of Clinical Sleep Medicine

COMMENTARY

How adherent are obese children with sleep-disordered breathing on positive airway pressure therapy?

Commentary on Katz SL, Kirk VG, MacLean JE, et al. Factors related to positive airway pressure therapy adherence in children with obesity and sleep-disordered breathing. *J Clin Sleep Med.* 2020;16(5):733–741. doi:10.5664/jcsm.8336

Sanjeev V. Kothare, MD[1,2]; Kristin Kelly-Pieper, MD[2,3]

[1]*Division of Pediatric Neurology, Department of Pediatrics, Cohen Children's Medical Center, New Hyde Park, New York;* [2]*Pediatric Sleep Program, Cohen Children's Medical Center, New Hyde Park, New York;* [3]*Division of Pediatric Pulmonary & Cystic Fibrosis Center, Cohen Children's Medical Center, New Hyde Park, New York*

Obstructive sleep apnea (OSA), characterized by partial or complete airway obstruction that disrupts normal ventilation and patterns sleep, is seen with increasing prevalence in children with obesity compared with children without obesity[1] because of factors affecting airway anatomy, altered chest wall dynamics, and altered ventilatory drive.[2,3] Although tonsillectomy and adenoidectomy are often curative in children without obesity, obesity is a major risk factor for residual OSA and recurrence of OSA.[4,5] Positive airway pressure (PAP) therapy is an alternative treatment for children and adolescents with obesity with OSA. Although PAP therapy is effective and relatively safe, poor adherence is a major barrier to this treatment modality.[6]

In this issue of the *Journal of Clinical Sleep Medicine*, Katz et al[7] used a subset of a prospective multicenter study to look at factors affecting adherence to PAP therapy in older children and young teens with obesity (defined by body mass index [BMI] ≥ 95th percentile for sex and age). Baseline polysomnography (PSG) data were used to identify youth with moderate-severe OSA for whom PAP therapy was recommended. Significant underlying medical conditions and recent consistent use of PAP therapy were exclusionary criteria. Of note, the study aimed to include patients with obesity hypoventilation as well, but none of the patients met diagnostic criteria. Patients were followed for a year, and at the end of the observation period, parent and patient questionnaires, use diaries, self-report, and objective PAP use downloads were used to determine PAP adherence. PAP adherence was defined by use of PAP therapy for an average of ≥4 h/night on >50% of nights. Of the 14 patients included in this study, 79% met the criteria for adherence to PAP therapy. Of the available baseline PSG data (apnea-hypopnea index, obstructive apnea-hypopnea index, lowest oxygen saturation, and highest CO_2), only the oxygen saturation nadir had a statistically significant difference. Questionnaire data showed overall agreement in parent and child perception of PAP use. Most patients and parents report patient control of PAP use. Although not examined statistically, there were some notable trends in individual questions, including those about initial experience and expectations that suggested a difference between the adherent and nonadherent groups.

Most limitations with the study are related to the small sample size of 11 patients, of which there were only 3 nonadherent patients (2 bilevel positive airway pressure and 1 continuous positive airway pressure users). There were also 2 patients who did not have objective PAP machine downloads. Presumably, these patients would have categorize themselves as adherent, as self-report reports and diaries would tend to overestimate use.[8] With such a small sample size, these may have influenced the data significantly. Although as a group, there was no difference in baseline BMI, it would have been helpful to include individual values of BMI on figure 1 in Katz et al.[7] Also, because obesity and OSA have a bidirectional relationship,[9] change in weight or BMI over the 1-year observation period could be important information affecting adherence, because significant weight gain or loss might make PAP settings or perception of PAP need change with time. Additional saturation data from PSG and titration/PAP setup would also have added to the study. Pediatric OSA is more than just the obstructive apnea-hypopnea index[10] and isolated extremes of O_2 and CO_2 data. Other PSG measurements may have been helpful to see if they affected adherence; for example, presence of sleep fragmentation and additional saturation data could be suggestive of chronic partial obstruction. Likewise, quality of titration, pressure settings, use of comfort settings, and type of interface that may all have affected early acceptance of PAP.

A benefit from the study is that it highlights some possible areas of intervention that might lead to improved PAP adherence. Most adherent patients reported "It was easy getting used to PAP," whereas none of the nonadherent group did. Similarly, most of the adherent patients responded positively to "I expected PAP to make me feel better" compared with the nonadherent group. All the nonadherent group "expected PAP to be a hassle." A very important observation in this study was that most patients and parents alike identify the patient as being in charge of their PAP use, the expectation of which may be somewhat unrealistic given that some patients were as young as 8 years old. Additional baseline characteristics regarding

parental education level and other social factors would have added to interpretation of some of the results.

Looking ahead, future multicentric studies would benefit from a larger group with increased objective data from baseline PSG and titration studies allowing a multivariate analysis. However, findings from this study suggest that even now, we can implement strategies that may improve patient acceptance of PAP therapy, possibly with education and comfort measures targeted at adjusting patient expectations and making early use more easily accepted.

CITATION

Kothare SV, Kelly-Pieper K. How adherent are obese children with sleep-disordered breathing on positive airway pressure therapy? *J Clin Sleep Med*. 2020;16(5):663–664.

REFERENCES

1. Redline S, Tishler PV, Schluchter M, Aylor J, Clark K, Graham G. Risk factors for sleep-disordered breathing in children. Associations with obesity, race, and respiratory problems. *Am J Respir Crit Care Med*. 1999;159(5 Pt 1):1527–1532.
2. Tauman R, Gozal D. Obesity and obstructive sleep apnea in children. *Paediatr Respir Rev*. 2006;7(4):247–259.
3. Arens R, Muzumdar H. Childhood obesity and obstructive sleep apnea syndrome. *J Appl Physiol*. 2010;108(2):436–444.
4. Tauman R, Gulliver TE, Krishna J, et al. Persistence of obstructive sleep apnea syndrome in children after adenotonsillectomy. *J Pediatr*. 2006;149(6):803–808.
5. Amin R, Anthony L, Somers V, et al. Growth velocity predicts recurrence of sleep-disordered breathing 1 year after adenotonsillectomy. *Am J Respir Crit Care Med*. 2008;177(6):654–659.
6. Marcus CL, Rosen G, Ward SL, et al. Adherence to and effectiveness of positive airway pressure therapy in children with obstructive sleep apnea. *Pediatrics*. 2006;117(3):e442–e451.
7. Katz SL, Kirk VG, MacLean JE, et al. Factors related to positive airway pressure therapy adherence in children with obesity and sleep-disordered breathing. *J Clin Sleep Med*. 2020;16(5):733–741.
8. Salepci B, Caglayan B, Kiral N, et al. CPAP adherence of patients with obstructive sleep apnea. *Respir Care*. 2013;58(9):1467–1473.
9. KellyPieper K, Lamm C, Fennoy I. Sleep and obesity in children: a clinical perspective. *Minerva Pediatr*. 2011;63(6):473–481.
10. Rosen CL. Obstructive sleep apnea syndrome (OSAS) in children: diagnostic challenges. *Sleep*. 1996;19(suppl 10):S274–S277.

SUBMISSION & CORRESPONDENCE INFORMATION

Submitted for publication March 20, 2020
Submitted in final revised form March 20, 2020
Accepted for publication March 20, 2020
Address correspondence to: Sanjeev V. Kothare, MD, FAASM, Zucker School of Medicine at Hofstra/Northwell, 2001 Marcus Avenue, Suite W290, Lake Success, NY 11042; Tel: (516) 465-5255; Fax: (718) 347-2240; Email: skothare@northwell.edu

DISCLOSURE STATEMENT

All authors have seen and approved the manuscript. The authors report no conflicts of interest.