

Articles of the Month – September 2021

MAD

Sleep and breathing online Sept 2021

Link: [Effects of oral appliances on serum cytokines in adults with obstructive sleep apnea: a systematic review \(springer.com\)](https://www.springer.com)

Effects of oral appliances on serum cytokines in adults with obstructive sleep apnea: a systematic review

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Purpose: This review aimed to evaluate the effects of oral appliance (OA) therapy on serum inflammatory cytokines in adults diagnosed with obstructive sleep apnea (OSA).

Methods: Seven electronic databases and partial gray literature were searched without restrictions through March 2021. Articles evaluating the levels of serum inflammatory cytokines in patients with OSA after OA treatment were included. The risk of bias (RoB) was assessed using the before-and-after tool or RoB 2.0. The level of certainty was assessed using the GRADE tool.

Results: Five studies met the eligibility criteria. One was a randomized clinical trial (RCT), while four were non-randomized clinical trials (NRCTs). Among the studies, C-reactive protein (CRP), IL-6, IL-10, IL-1 β , and tumor necrosis factor α (TNF- α) were investigated. The RCT reported no significant differences in marker levels after 2 months of OA therapy, while the NRCTs showed improvement on CRP, TNF- α , and IL-1 β levels after longer follow-up periods. The RoB was evaluated as showing some concern in the RCT. Three NRCTs presented good RoB, and one showed a fair RoB. The level of certainty was graded as moderate quality for inflammatory marker levels assessed in the RCT. The levels of certainty evaluated in NRCTs were classified as very low.

Conclusions: Although limited, existing scientific evidence showed that OA therapy may improve serum cytokine levels in adults with OSA. However, short treatment periods are not effective in reducing markers of systemic inflammation which may require extended time and a decrease of in apneic events to improve.

EADSM comment: Complex topic, also for CPAP treatment, although some beneficial long-term results for inflammatory markers have been detected.

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Link: <https://onlinelibrary.wiley.com/doi/epdf/10.1111/jsr.13462>

Partner perceptions are associated with objective sensor-measured adherence to oral appliance therapy in obstructive sleep apnea

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The aims of the present prospective clinical study were to determine objective, sensor-measured adherence to a mandibular advancement device (MAD) in patients with obstructive sleep apnea (OSA) and to identify partner-specific adherence-related factors. A total of 77 eligible participants with mild, moderate, or severe OSA and who were non-adherent to continuous positive airway pressure (mean age 56.2 years) participated in the study (32.5% women). The mean (range) observation time between MAD delivery and final follow-up was 8.3 (3.4-16.5) months. The mean apnea-hypopnea index (AHI) was 26.6 events/hr at baseline and 12.5 events/hr at the 8-month follow-up (both $p < 0.001$). The mean sensor-measured adherence at the 8-month follow-up was 60.1% for ≥ 4 hr/night of appliance use for ≥ 5 days/week. Average usage was 6.4 hr/night, when worn. The mean reduction in the AHI was significantly greater in the "good adherence" ($\Delta 17.4$) than the "poor adherence" group ($\Delta 11.0$; $p < 0.05$). From the partner's perspective, the appliance had a positive effect on sharing a bedroom in the good- (55%) compared to the poor-adherence group (25%; $p < 0.05$) and on their relationship (51.7% versus 17.9%, respectively; $p < 0.05$). Regression analyses identified the partner's snoring and apneas to be the most significant factor predicting good adherence to MAD (odds ratio 4.4, 95% confidence interval 1.4-14.0). In conclusion, social factors, like partner perceptions, were positively associated with adherence, which indicate that partner's attitudes and support may be a resource that can be utilised to improve adherence in oral appliance treatment of OSA.

EADSM comment: Study that highlight partner's importance in MAD treatment, a relatively neglected area.

Drug-induced Sleep Endoscopy (DISE) with Simulation Bite to Predict the Success of Oral Appliance Therapy in Treating Obstructive Sleep Apnea/Hypopnea Syndrome (OSAHS)

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Study objectives: Oral appliances have gained their place in the treatment of obstructive sleep apnea (OSA) where custom-made titratable mandibular advancement devices (MAD) have become the oral appliance of choice. This study aimed to assess the value of the drug-induced sleep endoscopy (DISE) using a MAD in the prediction of treatment outcome for OSAHS.

Methods: This is a prospective, single-center cohort study that enrolled sixty-six consecutive patients with diagnosed OSA (5 events/h < apnea-hypopnea index (AHI) < 50 events/h) to be treated with a custom-made titratable MAD. The patients were evaluated polysomnographically with the MAD in situ after the adaptation and titration period of 3 months. The associations between findings during DISE and treatment outcome were assessed.

Results: The subjects showed a wide range of severity of OSAHS pre-treatment: median AHI was 43.10 with a range from 20.13 to 66.07. The simulation bite was associated with a significant increase in cross-sectional area at level of the velopharynx, tongue base and epiglottis. MAD treatment response in the studied population was 91%, with a mean AHI improving from 43.10 to 12.93.

Conclusions: Drug-induced sleep endoscopy with simulation bite is an acceptably reproducible technique for determining the sites of obstruction in OSAHS subjects; it thus offers possibilities as a prognostic indicator for treatment with MAD.

EADSM comment: Another study that highlights the usefulness of DISE in the prediction of MAD outcomes.

Novel ways of analysing

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Link: <https://www.atsjournals.org/doi/pdf/10.1164/rccm.202011-4055OC>

Endotyping Sleep Apnea One Breath at a Time: An Automated Approach for Separating Obstructive from Central Sleep Disordered Breathing

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Rationale: Determining whether an individual has obstructive or central sleep apnea is fundamental to selecting the appropriate treatment.

Objectives: Here we derive an automated breath-by-breath probability of obstruction, as a surrogate of gold-standard upper airway resistance, using hallmarks of upper airway obstruction visible on clinical sleep studies.

Methods: From 5 NPSG signals (airflow, thoracic and abdominal effort, oxygen saturation, and snore), 9 features were extracted and weighted to derive the breath-by-breath probability of obstruction (Pobs). A development and initial test set of 29 subjects (development=6, test=23, New York, USA) and a second test set of 39 subjects (Solingen, Germany), both with esophageal manometry, were used to develop Pobs and validate it against gold-standard upper airway resistance. A separate dataset of 114 subjects with 2 consecutive NPSGs (New York, USA) without esophageal manometry was used to assess the night-to-night variability of Pobs.

Main results: A total of 1,962,229 breaths were analyzed. On a breath-by-breath level, Pobs was strongly correlated with normalized upper airway resistance in both test sets (Set1: cubic adj.R²=0.87, p<0.001, AUC=0.74; Set2: cubic adj.R²=0.83, p<0.001, AUC=0.7). On a subject-level, median Pobs was associated with the median normalized upper airway resistance (Set1: linear adj.R²=0.59, p<0.001; Set2: linear adj.R²=0.45, p<0.001). Median Pobs exhibited low night-to-night variability (ICC(2,1)=0.93).

Conclusions: Using nearly 2 million breaths from 182 subjects, we show that breath-by-breath probability of obstruction can reliably predict the overall burden of obstructed breaths in individual subjects and can aid in determining the type of sleep apnea. This article is open access and distributed under the terms of the Creative Commons Attribution Non-Commercial No Derivatives License 4.0 (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

EADSM comment: Interesting new way of describing OSA by looking at each breath. This study introduces new possibilities to diagnose OSA.