Articles of the Month – March 2023

MAD

Sleep Breath. 2023 Mar 2.

 doi: 10.1007/s11325-023-02796-2. Online ahead of print.Link: https://link.springer.com/article/10.1007/s11325-023-02796-2

# Mandibular advancement devices used with morning occlusal guides for treating obstructive sleep apnea-changed incisor inclination and its associated factors

[Prapaporn Zheng](https://pubmed.ncbi.nlm.nih.gov/?sort=date&term=Zheng+P&cauthor_id=36862328)[1](https://pubmed.ncbi.nlm.nih.gov/36862328/#affiliation-1), [Premthip Chalidapongse](https://pubmed.ncbi.nlm.nih.gov/?sort=date&term=Chalidapongse+P&cauthor_id=36862328)[2](https://pubmed.ncbi.nlm.nih.gov/36862328/#affiliation-2)[3](https://pubmed.ncbi.nlm.nih.gov/36862328/#affiliation-3), [Chidsanu Changsiripun](https://pubmed.ncbi.nlm.nih.gov/?sort=date&term=Changsiripun+C&cauthor_id=36862328)[4](https://pubmed.ncbi.nlm.nih.gov/36862328/#affiliation-4)

**Purpose:**Mandibular advancement devices (MADs) effectively treat patients with obstructive sleep apnea (OSA). Although the use of morning occlusal guides (MOGs) along with MADs is recommended to prevent dental side effects, there is no evidence to support this. The aim of this study was to evaluate the change in incisor inclination in patients with OSA treated with MADs and MOGs, and to identify its predictive factors.

**Methods:**Patients with OSA who received MAD and MOG therapy and had a reduction in their apnea-hypopnea index greater than 50% were analyzed. Cephalometric measurements were performed at baseline and at a 1-year follow-up or longer to assess the dentoskeletal side effects of MAD/MOG treatment. Multivariable linear regression analysis was used to assess the association between the change in incisor inclination and the independent variables that may cause the observed side effects.

**Results:**Among 23 patients enrolled in the study, there was significant upper incisor retroclination (U1-SN: 2.83° ± 2.68°, U1-PP: 2.86° ± 2.46°; P < 0.05) and significant lower incisor proclination (L1-SN: 3.04° ± 3.29°, L1-MP: 1.74° ± 3.13°; P < 0.05). However, no significant skeletal changes were observed. Multivariable linear regression revealed that advancement ≥ 95% of the patients' maximal mandibular protrusion was associated with greater upper incisor retroclination. Increased treatment duration was also associated with increased upper incisor retroclination. No \measured variables were associated with the change in lower incisor inclination.

**Conclusions:**Dental side effects occurred in patients who used MADs with MOGs. The amount of mandibular protrusion by MADs and treatment duration were predictive factors associated with upper incisor retroclination.

*EADSM* comment: The addition of occlusal guides did not prevent from tooth movements in this small study. The study did not, however, have the design to show, if side effects are reduced by this intervention.

Sleep Breath. 2023 Mar 3.

 doi: 10.1007/s11325-023-02799-z. Online ahead of print.

Link: https://link.springer.com/article/10.1007/s11325-023-02799-z

# Effects of continuous positive airway pressure and mandibular advancement appliance therapy on sleep bruxism in adults with obstructive sleep apnea: a pilot study

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**Study objectives:**This study aimed to investigate the effects of continuous positive airway pressure (CPAP) and mandibular advancement appliance (MAA) therapy on rhythmic masticatory muscle activity (RMMA), a biomarker of sleep bruxism (SB), and to compare the effects of CPAP with MAA in adults with obstructive sleep apnea (OSA).

**Methods:**This cohort study included individuals with OSA who received treatment with CPAP or MAA. Polysomnographic recordings with and without therapy were performed in each individual. Statistical analyses were performed with repeated measures ANOVA.

**Results:**A total of 38 individuals with OSA were enrolled, 13 on CPAP and 25 with MAA, mean age 52.6 ± 10.6 years, 32 men, mean baseline apnea-hypopnea index (AHI) 26.5 ± 15.2 events/hour, mean RMMA index 3.5 ±events/hour. In the total group, the RMMA index decreased significantly with CPAP and MAA therapies (P < 0.05). The changes in the RMMA index with therapy did not differ significantly between CPAP and MAA (P > 0.05). The RMMA index decreased in 60% of the individuals with OSA, and the changes ranged widely, with a median of 52% and an interquartile range of 107%.

**Conclusions:**Both CPAP and MAA therapies significantly reduce SB in individuals with OSA. However, the interindividual differences in the effects of these therapies on SB are large.

*EADSM* comment: Study bringing more light into the relationships between sleep bruxism and sleep disordered breathing, where both MAD and CPAP reduce bruxism. The causalities are still unclear.

Clin Oral Investig. 2023 Mar 17.

 doi: 10.1007/s00784-023-04945-z. Online ahead of print.

Link: <https://link.springer.com/article/10.1007/s00784-023-04945-z>

# Comparisons of the effects of two types of titratable mandibular advancement devices on respiratory parameters and upper airway dimensions in patients with obstructive sleep apnea: a randomized controlled trial

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**Objectives:**To compare the effects of two types of titratable mandibular advancement devices (MADs), namely MAD-H (allowing limited vertical opening) and MAD-S (allowing free vertical opening), on respiratory parameters and upper airway dimensions in patients with mild to moderate obstructive sleep apnea (OSA).

**Materials and methods:**Patients with mild to moderate OSA (5 ≤ apnea-hypopnea index (AHI) < 30 /h) were randomly assigned to two parallel MAD groups. All MADs were subjectively titrated according to a standardized protocol during a 3-month follow-up. Every patient underwent two polysomnographic recordings, and two cone beam computed tomography scans in supine position: one at baseline and another one after 3 months with the MAD in situ. The primary outcome variables were the AHI in supine position (AHI-supine) and the minimal cross-sectional area of the upper airway in supine position (CSAmin-supine).

**Results:**A total of 49 patients were recruited, and 31 patients (21 men and 10 women) with a mean (± SD) age of 48.5 (± 13.9) years and a mean AHI of 16.6 (± 6.7) /h completed the study. In the per-protocol analysis, there was no significant difference between MAD-H (n = 16) and MAD-S (n = 15) in their effects on AHI-supine (P = 0.14) and CSAmin-supine (P = 0.59). Similar results were found in the intention-to-treat analysis (P = 0.47 and 0.57, respectively).

**Conclusions:**Within the limitations of this study, we conclude that there is no significant difference in the effects of an MAD allowing limited vertical opening and an MAD allowing free vertical opening on respiratory parameters and upper airway dimensions in patients with mild to moderate OSA.

**Clinical relevance:**MADs allowing limited vertical opening and allowing free vertical opening have similar effects on respiratory parameters and upper airway dimensions in patients with mild to moderate OSA.

*EADSM* comment: This study compares two types of MADs regarding efficacy. However, both appliances allows mouth-opening, in contrast to what the authors claim. Even if elastic bands are used for the Herbst appliance, these must be tight and continuously exchanged in order to reduce mouth opening. The lack of difference in efficacy between the two appliances is therefore expected.

Int J Environ Res Public Health. 2023 Feb 17;20(4):3561.

 doi: 10.3390/ijerph20043561.

Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9960680/

# Antero-Posterior Mandibular Excursion in Obstructive Sleep Apnea Patients Treated with Mandibular Advancement Device: A Retrospective Cohort Study

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Since obstructive sleep apnea (OSA) management with a mandibular advancement device (MAD) is likely to be life-long, potential changes in mandibular movements during therapy should be investigated. The purpose of this study was to use a method that has already been shown to be reliable in order to determine whether the range of antero-posterior mandibular excursion, the procedure upon which MAD titration is based, varies between baseline (T0) and at least 1 year of treatment (T1). The distance between maximal voluntary protrusion and maximal voluntary retrusion determined using the millimetric scale of the George Gauge was retrospectively collected from the medical records of 59 OSA patients treated with the MAD and compared between T0 and T1. A regression analysis was performed to evaluate the influence of treatment time, MAD therapeutic advancement and the patient's initial characteristics in excursion range variation. A statistically significant increase of 0.80 ± 1.52 mm (mean ± standard deviation, *p* < 0.001) was found for antero-posterior mandibular excursion. The longer the treatment time (*p* = 0.044) and the smaller the patient's mandibular excursion at T0 (*p* = 0.002), the greater the increase was. These findings could be explained by a muscle-tendon unit adaptation to the forward mandibular repositioning induced by the MAD. During MAD therapy, patients can develop a wider range of antero-posterior mandibular excursion, especially those with a smaller initial excursion capacity.

*EADSM* comment: Confirmation of previously reported findings from a 2-year follow-up.1

 OSA

Sleep Breath. 2023 Feb 28.

 doi: 10.1007/s11325-023-02786-4. Online ahead of print.

Link: [Clinical phenotypes of obstructive sleep apnea: a cluster analysis based on sleep perception and sleep quality | SpringerLink](https://link.springer.com/article/10.1007/s11325-023-02786-4)

# Clinical phenotypes of obstructive sleep apnea: a cluster analysis based on sleep perception and sleep quality

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**Purpose:**To determine obstructive sleep apnea (OSA) phenotypes using cluster analysis including variables of sleep perception and sleep quality and to further explore factors correlated with poor sleep quality in different clusters.

**Methods:**This retrospective study included patients with OSA undergoing polysomnography (PSG) between December 2020 and April 2022. Two-step cluster analysis was performed to detect distinct clusters using sleep perception variables including discrepancy in total sleep time (TST), sleep onset latency (SOL), and wakefulness after sleep onset (WASO); objective TST, SOL, and WASO; and sleep quality. One-way analysis of variance or chi-squared tests were used to compare clinical and PSG characteristics between clusters. Binary logistic regression analyses were used to explore factors correlated with poor sleep quality.

**Results:**A total of 1118 patients were included (81.6% men) with mean age ± SD 43.3 ± 13.1 years, Epworth sleepiness score, 5.7 ± 4.4, and insomnia severity index 3.0 ± 2.4. Five distinct OSA clusters were identified: cluster 1 (n = 254), underestimated TST; cluster 2 (n = 158), overestimated TST; cluster 3 (n = 169), overestimated SOL; cluster 4 (n = 155), normal sleep discrepancy and poor sleep quality; and cluster 5 (n = 382), normal sleep discrepancy and good sleep quality. Patients in cluster 2 were older, more commonly had hypertension, and had the lowest apnea-hypopnea index and oxygen desaturation index. Age and sleep efficiency were correlated with poor sleep quality in clusters 1, 2, and 5, and also AHI in cluster 2.

**Conclusion:**Subgroups of patients with OSA have different patterns of sleep perception and quality that may help us to further understand the characteristics of sleep perception in OSA and provide clues for personalized treatment.

*EADSM* comment: Study focusing on patient´s perception of their sleep in terms of identifying clusters based on how well patients report their sleep and also in relation to hypertension and demography.

Chest. 2023 Jan 4;S0012-3692(23)00008-9.

 doi: 10.1016/j.chest.2022.12.029. Online ahead of print.

Link: https://www.sciencedirect.com/science/article/pii/S0012369223000089?via%3Dihub

# Night-to-Night Variability of Polysomnography-Derived Physiologic Endotypic Traits in Patients With Moderate to Severe OSA

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**Background:**Emerging data suggest that determination of physiologic endotypic traits (eg, loop gain) may enable precision medicine in OSA.

**Research question:**Does a single-night assessment of polysomnography-derived endotypic traits provide reliable estimates in moderate to severe OSA?

**Study design and methods:**Two consecutive in-lab polysomnography tests from a clinical trial (n = 67; male, 69%; mean age ± SD, 61 ± 10 years; apnea-hypopnea index [AHI] 53 ± 22 events/h) were used for the reliability analysis. Endotypic traits, reflecting upper airway collapsibility (ventilation with passive muscle activity [Vpassive]), upper airway dilator muscle tone (ventilation with active muscle activity [Vactive]), ventilatory control sensitivity (loop gain at 1 cycle/min [LG1]), and arousal threshold (ArTh) were determined. Reliability was expressed as an intraclass correlation coefficient (ICC). Minimal detectable differences (MDDs) were computed to provide an estimate of maximum spontaneous variability. Further assessment across four repeated polysomnography tests was performed in a subcohort (n = 22).

**Results:**Reliability of endotypic traits between the two consecutive nights was moderate to good (ICC: Vpassive = 0.82, Vactive = 0.76, LG1 = 0.72, ArTh = 0.83). Variability in AHI, but not in body position or in sleep stages, was associated with fluctuations in Vpassive and Vactive (r = -0.49 and r = -0.41, respectively; P < .001 for both). MDDs for single-night assessments were: Vpassive = 22, Vactive = 34, LG1 = 0.17, and ArTh = 21. Multiple assessments (mean of two nights, n = 22) further reduced MDDs by approximately 20% to 30%.

**Interpretation:**Endotypic trait analysis using a single standard polysomnography shows acceptable reliability and reproducibility in patients with moderate to severe OSA. The reported MDDs of endotypic traits may facilitate the quantification of relevant changes and may guide future evaluation of nonpositive airway pressure interventions in OSA.

*EADSM* comment: Important that there is little variability in the detection of non-anatomical physiological traits in the polysomnograms in patients with moderate and severe disease, if those are non-tolerant to PAP or interested in trying a non-PAP therapy.

Sleep. 2023 Jan 28;zsac310.

 doi: 10.1093/sleep/zsac310. Online ahead of print.

Link: <https://academic.oup.com/sleep/advance-article/doi/10.1093/sleep/zsac310/7008958>

# Pro: can physiological risk factors for obstructive sleep apnea be determined by analysis of data obtained from routine polysomnography?

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Sleep. 2023 Jan 9;zsac158.

 doi: 10.1093/sleep/zsac158. Online ahead of print.

Link: <https://academic.oup.com/sleep/advance-article/doi/10.1093/sleep/zsac158/6976052?login=true>

# Con: Can Physiological Risk Factors for Obstructive Sleep Apnea be Determined by Analysis of Data Obtained from Routine Polysomnography?

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*EADSM* comment:

Interesting Pro-Con debate articles if you are interested in the new ways of diagnosing OSA, including have access to this journal.

New treatments

Chest. 2022 Nov 24;S0012-3692(22)04194-0.

 doi: 10.1016/j.chest.2022.11.024. Online ahead of print.

Link: <https://www.sciencedirect.com/science/article/pii/S0012369222041940?via%3Dihub>

# Topical Potassium Channel Blockage Improves Pharyngeal Collapsibility: A Translational, Placebo-Controlled Trial

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**Background:**Potassium channel inhibition has been identified in animal models as a potential target to increase pharyngeal dilator muscle activity and to treat OSA. However, these findings have not yet been translated to humans.

**Research question:**Does a novel, potent, TWIK-related acid-sensitive K+ (TASK) 1/3 channel antagonist, BAY2586116, improve pharyngeal collapsibility in pigs and humans, and secondarily, what is the optimal dose and method of topical application?

**Study design and methods:**In the preclinical study, pharyngeal muscle activity and upper-airway collapsibility via transient negative pressure application was quantified in 13 anesthetized pigs during administration of placebo, 0.3 μg, 3 μg, and 30 μg nasal drops of BAY2586116. In the clinical study, 12 people with OSA instrumented with polysomnography equipment, an epiglottic pressure catheter, pneumotachograph, and nasal mask to monitor sleep and breathing performed up to four detailed upper airway sleep physiology studies. Participants received BAY2586116 or placebo nasal spray (160 μg) before sleep via a double-masked, randomized, crossover design. Most participants also returned for three additional overnight visits: (1) nasal drops (160 μg), (2) half-dose nasal spray (80 μg), and (3) direct endoscopic application (160 μg). The upper-airway critical closing pressure during sleep was quantified at each visit.

**Results:**Consistent and sustained improvements in pharyngeal collapsibility to negative pressure were found with 3 and 30 μg of BAY2586116 vs placebo in pigs. Similarly, BAY2586116 improved pharyngeal collapsibility by an average of approximately 2 cm H2O vs placebo, regardless of topical application method and dose (P < .008, mixed model) in participants with OSA.

**Interpretation:**Acute topical application of BAY2586116 improves upper-airway collapsibility in anesthetized pigs and sleeping humans with OSA. These novel physiologic findings highlight the therapeutic potential to target POTASSIUM channel mechanisms to treat OSA.

*EADSM* comment: Interesting new way for possibly treating OSA in the future, including a quite simple method, by nasal drops.

CPAP

Sleep and Breathing
Sleep Breathing Physiology and Disorders • Original Article
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Link: https://link.springer.com/article/10.1007/s11325-023-02795-3

# Adherence to continuous positive airway pressure treatment in a cohort of elderly adults with newly diagnosed obstructive sleep apnea.

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### **Purpose**

To evaluate adherence to continuous positive airway pressure (CPAP) treatment in elderly patients newly diagnosed with obstructive sleep apnea syndrome (OSAS).

### **Methods**

Consecutive patients ≥ 70 years attending one of the participating centers, requiring CPAP treatment and agreeing to participate, were included. Mean hours of CPAP during the first 5 months of treatment defined adherence as CPAP ≥ 4 h/day on 70% of nights over a 30-day period.

### **Results**

From January 2014 to April 2019, 262 patients aged between 76.7 and 87.7 years (mean age, 82.6 years) were included and fully evaluated; 224 (85.5%) were adherent. Mean adherence time was 6.9 h in adherent patients, vs 2 h in non-adherent patients (*p* < 0.0001). Compared to non-adherent patients, adherent patients tended to have higher baseline AHI without reaching statistical significance (44.7 vs 39.5, *p* = 0.0913). They less frequently presented with dementia (3.7% vs 21.6%, *p* < 0.0001). The somnolence (ODSI and Epworth), nocturia, and depression (QD2A) scores of adherent patients improved significantly from baseline to the fifth month: ODSI decreased from 7 to 3.7 (*p* < 0.0001), Epworth from 8.7 to 6.2 (*p* < 0.0001), nocturia from 6.6 to 4.1 (*p* = 0.0015), and QD2A from 3.7 to 3 (*p* = 0.0025). Many more patients in the non-adherent group used nasal plugs than in the adherent group (14.7% vs 2.1%, *p* = 0.0006).

### **Conclusion**

The present real-world study showed the ability of newly diagnosed elderly adults (including the very old) to adhere to CPAP therapy and the benefit of 5 months’ well-conducted CPAP treatment.

*EADSM* comment: Study describing PAP-treatment in a less studied group; the really elderly.

DENTISTRY

Review

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# Association between periodontal diseases and cardiovascular diseases, diabetes and respiratory diseases: Consensus report of the Joint Workshop by the European Federation of Periodontology (EFP) and the European arm of the World Organization of Family Doctors (WONCA Europe)

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**Aim:**To explore the implications for dentists and family doctors of the association between periodontal and systemic diseases and the role of dentists and family doctors in managing non-communicable diseases (NCDs) and promoting healthy lifestyles.

**Materials and methods:**The consensus reports of the previous Focused Workshops on the associations between periodontitis and diabetes (2017) and periodontitis and cardiovascular diseases (2019) formed the technical reviews to underpin discussions on both topics. For the association with respiratory diseases, a systematic review was specifically commissioned for the Workshop discussions. Working groups prepared proposals independently, and then the proposals were discussed and approved at plenary meetings.

**Results:**Periodontitis is independently associated with cardiovascular diseases, diabetes, chronic obstructive pulmonary disease (COPD), obstructive sleep apnea and COVID-19 complications. Dentists and family doctors should collaborate in managing NCDs, implementing strategies for early detection of periodontitis in primary care centres and of cardiovascular diseases or diabetes in dental settings. Family doctors should be informed about periodontal diseases and their consequences, and oral health professionals (OHPs) should be informed about the relevance of NCDs and the associated risk factors.

**Conclusions:**Closer collaboration between OHPs and family doctors is important in the early detection and management of NCDs and in promoting healthy lifestyles. Pathways for early case detection of periodontitis in family medicine practices and of NCDs in dental practices should be developed and evaluated.

*EADSM* comment: Nice overview about possible benefits from more collaboration between dentists and family physicians.

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