



# ORAL APPLIANCE THERAPY

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## About Us

We help grow your sleep practice by simplifying OSA treatment with oral appliances

App-Nea has pioneered the next generation of cloud-based Dental Sleep Medicine practice and patient management. App-Nea provides the most innovative suite of software and practice management services, offering a complete end-to-end solution for dentists and physician practices while elevating patient treatment and experience.



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# THE EFFICACY OF ORAL APPLIANCE THERAPY



Loud snoring may be the most obvious consequence of sleep apnea, but the condition, if left untreated, can lead to a broad range of complications, including high blood pressure, heart disease, liver dysfunction and Type 2 diabetes.



- NICHOLAS BAKALAR

as quoted in NYT article, "For Sleep Apnea, a Mouth Guard  
May be a Good Alternative to CPAP" published 5/31/21

# THE EFFICACY OF ORAL APPLIANCE THERAPY

## TITLE

Cardiovascular Effects of Oral Appliance Therapy in Obstructive Sleep Apnea: A Systematic Review and Meta-Analysis

## IMPORTANCE

While more research is needed, initial evidence shows that oral appliance therapy (OAT) can help reduce the risk of serious cardiovascular outcomes and cardiovascular-related death.

## CITATION

de Vries GE, Wijkstra PJ, Houwerzijl EJ, Kerstjens HAM, Hoekema A. Cardiovascular effects of oral appliance therapy in obstructive sleep apnea: A systematic review and meta-analysis. *Sleep Med Rev.* 2018;40:55-68. doi:10.1016 /j.smrv.2017.10.004

## SUMMARY

This systematic review and meta-analysis of 16 studies examined the impact of OAT on cardiovascular outcomes. OAT has small but positive impact on daytime systolic and diastolic blood pressure. The authors write that “[i]n some patients, OAT and continuous positive airway pressure (CPAP) can be equally effective in reducing blood pressure.” Furthermore, OAT improves mean daytime heart rate, when compared to a sham device. One study examined showed that OAT and CPAP were equally effective in reducing the risk of cardiovascular mortality. The authors conclude that while more rigorous research is necessary, OAT can reduce cardiovascular morbidity and mortality.

## WEB URL LINK

<https://www.sciencedirect.com/science/article/abs/pii/S1087079217301363>

# THE EFFICACY OF ORAL APPLIANCE THERAPY

## TITLE

Effect of Oral Appliances on Blood Pressure in Obstructive Sleep Apnea: A Systematic Review and Meta-analysis

## IMPORTANCE

This research concludes that oral appliance therapy (OAT) effectively lowers blood pressure in patients with mild to moderate obstructive sleep apnea (OSA).

## CITATION

Iftikhar IH, Hays ER, Iverson MA, Magalang UJ, Maas AK. Effect of oral appliances on blood pressure in obstructive sleep apnea: a systematic review and meta-analysis. *J Clin Sleep Med*. 2013;9(2):165-174. doi:10.5664/jcsm.2420

## SUMMARY

The authors of this study conducted a meta-analysis of 7 studies, which enrolled a total of 399 patients with mild-to-moderate OSA. The main objective of the study was to understand the effect of OAT on blood pressure. The meta-analysis shows that OAT improves blood pressure control for patients with mild to moderate sleep apnea. Reductions in both systolic blood pressure (SBP) and diastolic blood pressure (DBP), as well as in nocturnal SBP, were seen with OAT. "Although the reductions in BP with OAs were modest, these effects were comparable to those reported with continuous positive airway pressure (CPAP) treatment." Across the board, effective oral appliance therapy, as evidenced by a decreased apnea-hypopnea index (AHI), leads to a decrease in SBP, DBP and mean arterial blood pressure (MAP). "Previous studies have shown that even a modest reduction in BP may reduce the risk of coronary artery disease and stroke." Thus, both CPAP and OAT can lead to a similar modest reduction in blood pressure.

## WEB URL LINK

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3544387/>

# THE EFFICACY OF ORAL APPLIANCE THERAPY

## TITLE

Cardiovascular Mortality in Obstructive Sleep Apnea Treated with Continuous Positive Airway Pressure or Oral Appliance: An Observational Study

## IMPORTANCE

This study shows that oral appliance therapy (OAT) can reduce the risk of heart-related death for patients with severe obstructive sleep apnea (OSA).

## CITATION

Anandam A, Patil M, Akinnusi M, Jaoude P, El-Solh AA. Cardiovascular mortality in obstructive sleep apnoea treated with continuous positive airway pressure or oral appliance: an observational study. *Respirology*. 2013;18(8):1184-90. doi: 10.1111/resp.12140.

## SUMMARY

This non-concurrent cohort study of 570 patients with severe OSA was conducted to understand the long-term outcomes for cardiovascular mortality. Patients began their therapy with continuous positive airway pressure (CPAP). OAT was offered to patients who were not compliant with CPAP therapy. Patients were more compliant with OAT than with CPAP, overall. While AHI was lower in patients using CPAP, there was no significant difference between the two therapies in terms of cardiovascular death rate. Thus, both CPAP and MAD “may be equally effective in reducing the risk of fatal cardiovascular events in patients with severe OSA.”

## WEB URL LINK

<https://www.ncbi.nlm.nih.gov/pubmed/23731062>



# THE EFFICACY OF ORAL APPLIANCE THERAPY

## TITLE

Oral Appliance Therapy Reduces Blood Pressure in Obstructive Sleep Apnea: A Randomized, Controlled Trial

## IMPORTANCE

Oral appliance therapy (OAT) may be an effective alternative to continuous positive airway pressure (CPAP) when it comes to reduction of blood pressure.

## CITATION

Gotsopoulos H, Kelly JJ, Cistulli PA. Oral appliance therapy reduces blood pressure in obstructive sleep apnea: a randomized, controlled trial. *Sleep*. 2004;27(5):934-41. doi: 10.1093/sleep/27.5.934.

## SUMMARY

This study was a randomized, controlled, crossover trial with obstructive sleep apnea (OSA) patients. These patients wore an OA and a placebo device for 4 weeks each. Compared to the placebo device, patients experienced a 50% reduction in AHI. 34% of patients were considered a complete treatment success while another 30% were considered partial responders. When patients used the OA, they experienced a significant decrease in 24-hour diastolic blood pressure (compared to the control device). "Awake blood-pressure variables were reduced with the MAS by an estimated mean ( $\pm$  SEM) of  $3.3 \pm 1.1$  mmHg for systolic blood pressure ( $P = .003$ ) and  $3.4 \pm 0.9$  mmHg for diastolic blood pressure ( $P < .0001$ )." The study did not find any significant differences when measuring blood pressure variables during sleep. The authors argued that OAT can successfully reduce blood pressure in a manner similar to CPAP.

## WEB URL LINK

<https://pubmed.ncbi.nlm.nih.gov/15453552/>

# THE EFFICACY OF ORAL APPLIANCE THERAPY

## TITLE

Nocturnal Blood Pressure is Reduced by a Mandibular Advancement Device for Sleep Apnea in Women: Findings from Secondary Analyses of a Randomized Trial

## IMPORTANCE

Oral appliance therapy (OAT) may reduce nighttime blood-pressure in women. This finding also highlights the importance of understanding sex-related differences in treating obstructive sleep apnea (OSA) with OAT.

## CITATION

Rietz H, Franklin KA, Carlberg B, Sahlin C, Marklund M. Nocturnal blood pressure is reduced by a mandibular advancement device for sleep apnea in women: findings from secondary analyses of a randomized trial. *J Am Heart Assoc.* 2018;7(13):e008642.  
doi:10.1161/JAHA.118.008642

## SUMMARY

A total of 96 patients (27 women and 58 men) were included in this double-blind, randomized controlled trial. One group was given an OAT and the other a sham appliance. Among the female participants, nighttime systolic blood pressure was 10.8 mm Hg lower and diastolic pressure was 6.6 mm Hg lower among those using the OAT, compared to the sham appliance. These results were adjusted for confounding variables. Among the male participants, neither daytime or nighttime blood pressure levels differed significantly between the OAT group and the sham group.

## WEB URL LINK

<https://www.ahajournals.org/doi/full/10.1161/JAHA.118.008642>



# THE EFFICACY OF ORAL APPLIANCE THERAPY

## TITLE

Improved Cognitive Functions after Treatment with an Oral Appliance in Obstructive Sleep Apnea

## IMPORTANCE

This study shows that, after only six months of treatment, oral appliance therapy (OAT) can significantly improve daytime sleepiness and cognitive functions, specifically alertness and focus, of patients with mild to severe obstructive sleep apnea (OSA).

## CITATION

Tegelberg A, Wilhelmsson B, Erixon-Lindroth N, Lindström LH. Improved cognitive functions after treatment with an oral appliance in obstructive sleep apnea. *Nat Sci Sleep*. 2012;4:89-96. doi:10.2147/NSS.S33849

## SUMMARY

This prospective study of 50 male patients with OSA was conducted to better understand the impact of OAT on cognitive function. "Working memory, vigilance, executive functioning and mental pace" were assessed before and after 6 months of OAT. A total of 43 patients completed the treatment protocol. AHI, oxygen desaturation and daytime sleepiness were all significantly reduced. Furthermore, there was a reduction in the mean Epworth Sleepiness Scale. Results from patients with severe OSA were similar to that of the rest of the study participants.

## WEB URL LINK

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3630975/>

# THE EFFICACY OF ORAL APPLIANCE THERAPY

## TITLE

Effect of Oral Appliance Therapy on Neurobehavioral Functioning in Obstructive Sleep Apnea: A Randomized Controlled Trial

## IMPORTANCE

Oral appliance therapy (OAT) can be an effective therapy for patients who complain that their OSA is causing them to experience neuropsychological issues.

## CITATION

Naismith SL, Winter VR, Hickie IB, Cistulli PA. Effect of oral appliance therapy on neurobehavioral functioning in obstructive sleep apnea: a randomized controlled trial. *J Clin Sleep Med*. 2005 Oct 15;1(4):374-80.

## SUMMARY

The authors of this study conducted a randomized controlled trial of 73 patients who had “at least 2 symptoms of obstructive sleep apnea and an AHI  $\geq$  10 per hour.” This study was designed to better understand the impact of OAT on mood and neuropsychological functioning. Patients were treated with both an active OA and an inactive placebo device, each for 4 weeks. OAT use was associated with “improvements on the somatic component of the Beck Depression Inventory and the Vigor-Activity and Fatigue-Inertia scales of the Profile of Mood States.” Overall, OAT use was associated with increased psychomotor speed, as well as improved self-reported sleepiness and energy levels.

## WEB URL LINK

<https://jcsn.aasm.org/doi/pdf/10.5664/jcsn.26365>

# THE EFFICACY OF ORAL APPLIANCE THERAPY

## TITLE

Oral Appliance Therapy Improves Symptoms in Obstructive Sleep Apnea: A Randomized, Controlled Trial

## IMPORTANCE

Oral appliance therapy (OAT) improves daytime sleepiness and other subjective symptoms related to obstructive sleep apnea (OSA).

## CITATION

Gotsopoulos H, Chen C, Qian J, Cistulli PA. Oral appliance therapy improves symptoms in obstructive sleep apnea: A randomized, controlled trial. *Am J Respir Crit Care Med*. 2002;166(5):743-748. doi:10.1164/rccm.200203-2080C

## SUMMARY

This randomized crossover study involved randomizing 73 patients with OSA to either a group that received OAT or a placebo device. The trial lasted 4 weeks. Although objective sleepiness did not vary between the groups, subjective sleepiness was significantly better in the OAT group. Furthermore, OAT had a greater impact on snoring, sleep quality, witnessed apneas, and treatment satisfaction.

## WEB URL LINK

<https://www.atsjournals.org/doi/full/10.1164/rccm.200203-2080C>

# THE EFFICACY OF ORAL APPLIANCE THERAPY

## TITLE

A Randomized, Controlled Study of a Mandibular Advancement Splint for Obstructive Sleep Apnea

## IMPORTANCE

(OAT) can be an effective therapy for those with moderate-to-severe obstructive sleep apnea (OSA).

## CITATION

Mehta A, Qian J, Petocz P, Darendeliler MA, Cistulli PA. A randomized, controlled study of a mandibular advancement splint for obstructive sleep apnea. *Am J Respir Crit Care Med*. 2001;163(6):1457-1461. doi:10.1164/ajrccm.163.6.2004213

## SUMMARY

A total of 28 patients participated in this randomized, controlled, three-period crossover study. Two devices were used – an OA that advanced the mandible and an OA that did not advance the mandible. 26 patients completed the trial. Overall, the advanced appliance was well tolerated by 87.5% of respondents with high compliance (87.5% of participants reported using the advanced appliance nightly). Using the advanced appliance, 37.5% of patients achieved a complete response (reducing AHI to <5/h) and another 25% achieved a partial response ( $\geq 50\%$  reduction in AHI but  $\geq 5/h$  remaining) to treatment. The advanced appliance was associated with significant improvements in arousal index, MinSa<sub>02</sub> and AHI, compared with the non-advanced appliance. Overall, the authors concluded that OAT is effective, even with patients that have moderate-to-severe OSA.

## WEB URL LINK

<https://www.atsjournals.org/doi/full/10.1164/ajrccm.163.6.2004213>



# COMPLIANCE WITH ORAL APPLIANCE THERAPY



But CPAP machines can be noisy, cumbersome and uncomfortable, and many people stop using the devices altogether, which can have dire long-term consequences.



- NICHOLAS BAKALAR

as quoted in NYT article, "For Sleep Apnea, a Mouth Guard  
May be a Good Alternative to CPAP" published 5/31/21

# COMPLIANCE WITH ORAL APPLIANCE THERAPY

## TITLE

Objective Measurement of Compliance During Oral Appliance Therapy for Sleep-Disordered Breathing

## IMPORTANCE

Compliance with oral appliance therapy (OAT) is high, even when it is measured objectively.

## CITATION

Vanderveken OM, Dieltjens M, Wouters K, De Backer WA, Van De Heyning PH, Braem MJ. Objective measurement of compliance during oral appliance therapy for sleep-disordered breathing. *Thorax*. 2013;68(1):91-96. doi:10.1136/thoraxjnl-2012-201900

## SUMMARY

Often, OAT studies only report subjective compliance with therapy. This 3-month prospective clinical trial examined objectively measured compliance with OAT. 51 patients were given an OA with a microsensor compliance monitor. Overall, the objective mean use of the appliance was  $.6 \pm 1.3$  h per day. 93% of patients used the appliance for more than 4 hours per night. Subjective compliance was also measured and did not significantly differ from the objective measurement. Finally, 51.1% of cases were considered treatment successes.

## WEB URL LINK

<https://pubmed.ncbi.nlm.nih.gov/22993169/>

# COMPLIANCE WITH ORAL APPLIANCE THERAPY

## TITLE

Oral Appliance in Sleep Apnea Treatment: Respiratory and Clinical Effects and Long-Term Adherence

## IMPORTANCE

Oral appliance therapy (OAT) has very high long-term patient adherence.

## CITATION

Bachour P, Bachour A, Kauppi P, Maasilta P, Mäkitie A, Palotie T. Oral appliance in sleep apnea treatment: respiratory and clinical effects and long-term adherence. *Sleep Breath*. 2016;20(2):805-812. doi:10.1007/s11325-015-1301-0

## SUMMARY

This study examined the long-term adherence and clinical outcomes among patients using OAT. A total of 99 women and 204 men responded to this survey. Mean follow-up time was 3.3 years. Over this time, 86% of patients remained adherent to therapy. 97% of patients used the device for at least 4 hours a day and the mean daily use was  $7.2 \pm 1.1$  hr. AHI significantly decreased and both respiratory and asthma symptoms improved with OA use. 83% of patients reported an improved quality of life with OA treatment. OAT was also associated with a reduction in nocturia and use of nasal decongestants. Finally, OAT was associated with improvements in mood, headache and working ability.

## WEB URL LINK

<https://link.springer.com/article/10.1007%2Fs11325-015-1301-0>

# COMPLIANCE WITH ORAL APPLIANCE THERAPY

## TITLE

Adherence and Side Effects Among Patients Treated with Oral Appliance Therapy for Obstructive Sleep Apnea

## IMPORTANCE

Most patients continue to be adherent to OAT despite side effects. Education on the importance of treatment for OSA and mitigation of side effects could possibly reduce discontinuation of therapy. Qualified dentists are well prepared to mitigate side effects of OAT.

## CITATION

Murphy S, Maerz R, Sheets V, McLaughlin V, Beck M, Johnston WM, Firestone AR. Adherence and side effects among patients treated with oral appliance therapy for obstructive sleep apnea. *J Dent Sleep Med.* 2020;7(1)

## SUMMARY

The authors of this study conducted a survey of 136 patients who were either adherent to OAT, discontinued to use CPAP or who had discontinued all therapy and were no longer being treated. The majority of those surveyed continued to be adherent to OAT (76.1%). Of those in the no treatment group, 61.1% discontinued due to jaw pain and 22.2% due to occlusion changes. Of those in the CPAP group, 42.6% discontinued due to change in occlusion. While those in the adherent group reported some side effects, the authors hypothesize that the benefits of treatment outweighed the side effects. Furthermore, the respondents who continued OAT therapy had a greater concern about the negative effects of OSA, compared to the no treatment group. Partner satisfaction was significantly higher for participants still using OAT, compared to those using CPAP or no therapy.

## WEB URL LINK

<https://www.aadsm.org/docs/jdsm.1.10.20.o1.pdf>



# ORAL APPLIANCE THERAPY VS. CONTINUOUS POSITIVE AIRWAY PRESSURE



[OAT] is easy to tolerate, effective and it costs a lot less than CPAP. Thirty to 40 percent of our patients can't use CPAP, and these patients almost always find the dental appliance helpful. I would recommend it as a first-line treatment.



- DR. SACHAL BADLANI

MOUNT SINAI HOSPITAL - PULMONARY & CRITICAL CARE

# ORAL APPLIANCE THERAPY VS. CONTINUOUS POSITIVE AIRWAY PRESSURE

## TITLE

Health Outcomes of Continuous Positive Airway Pressure Versus Mandibular Advancement Device for the Treatment of Severe Obstructive Sleep Apnea: An Individual Participant Data Meta-Analysis

## IMPORTANCE

Due to the rigorous methodological nature of this study, it gives strong evidence for the effectiveness of oral appliance therapy (OAT) in populations with severe obstructive sleep apnea (OSA).

## CITATION

Trzepizur W, Cistulli PA, Glos M, et al. Health outcomes of continuous positive airway pressure versus mandibular advancement device for the treatment of severe obstructive sleep apnea: an individual participant data meta-analysis. *Sleep*. January 2021.  
doi:10.1093/sleep/zsab015

## SUMMARY

At the time of publication, this was the first meta-analysis to directly compare the impact of OAT and continuous positive airway pressure (CPAP) for patients with severe sleep apnea. The authors of this study included four randomized controlled trials in the final analysis. Although CPAP was more effective in reducing AHI and ODI, most patients preferred OAT. Furthermore, patients were far more compliant with OAT. There was no statistically significant difference between OAT and CPAP in terms of sleep architecture. Both therapies had a similar effect on sleep structure by increasing N3 and REM sleep. OAT was similar to CPAP in terms of impact on sleepiness and quality of life. The authors concluded that OAT is an effective alternative to CPAP, even among patients with severe OSA.

## WEB URL LINK

<https://academic.oup.com/sleep/advance-article-abstract/doi/10.1093/sleep/zsab015/6119670>

# ORAL APPLIANCE THERAPY VS. CONTINUOUS POSITIVE AIRWAY PRESSURE

## TITLE

Health Outcomes of Continuous Positive Airway Pressure versus Oral Appliance Treatment for Obstructive Sleep Apnea: A Randomized Controlled Trial

## IMPORTANCE

This study found that oral appliance therapy (OAT) is as effective as or better than continuous positive airway pressure (CPAP) therapy at improving adverse health effects in patients with moderate to severe obstructive sleep apnea (OSA).

## CITATION

Phillips CL, Grunstein RR, Darendeliler MA, et al. Health outcomes of continuous positive airway pressure versus oral appliance treatment for obstructive sleep apnea: A randomized controlled trial. *Am J Respir Crit Care Med*. 2013;187(8):879-887. doi:10.1164/rccm.201212-2223OC

## SUMMARY

The objective of this study was to compare health effects after one month of optimal treatment using CPAP and OAT to treat obstructive sleep apnea. A total of 108 patients completed the study with both devices, with the majority (82%) having moderate to severe OSA, with an average apnea-hypopnea index (AHI) of 22 and 42, respectively. Patients were significantly more compliant with OAT. Furthermore, more than half (51%) of patients preferred OAT, while less than a quarter (21.3%) preferred CPAP. The data suggest that both CPAP and OAT may reduce the risk of motor vehicle accidents among OSA patients who suffer from sleepiness. CPAP and OAT were similar in measures of quality of life, sleepiness and driving performance. These results may be explained by the greater compliance with OAT, when compared with CPAP. "These findings strongly challenge current practice parameters recommending [OAT] treatment be considered only in patients with mild to moderate OSA."

## WEB URL LINK

<http://www.atsjournals.org/doi/full/10.1164/rccm.201212-2223OC>

# ORAL APPLIANCE THERAPY VS. CONTINUOUS POSITIVE AIRWAY PRESSURE

## TITLE

Oral Appliance Therapy versus Nasal Continuous Positive Airway Pressure in Obstructive Sleep Apnea: A Randomized, Placebo-Controlled Trial

## IMPORTANCE

Continuous positive airway pressure (CPAP) and oral appliance therapy (OAT) are equally effective treatments, when the appliance is properly positioned.

## CITATION

Aarab G, Lobbezoo F, Hamburger HL, Naeije M. Oral appliance therapy versus nasal continuous positive airway pressure in obstructive sleep apnea: A randomized, placebo-controlled trial. *Respiration*. 2011;81(5):411-419. doi:10.1159/000319595

## SUMMARY

Many studies comparing OAT to CPAP use OAs that are not positioned objectively while the CPAP is objectively titrated. Thus, the comparison can be somewhat biased. This randomized controlled trial compared a placebo device, an objectively titrated CPAP and an objectively positioned OA. 64 patients were randomly assigned to these groups. The researchers found no difference in change to apnea-hypopnea index (AHI) between OAT and CPAP, although both were significantly better at reducing AHI than the placebo device. They concluded that there is no clinical difference between CPAP and OAT when it comes to treating patients with mild-to-moderate sleep apnea.

## WEB URL LINK

<https://www.karger.com/Article/FullText/319595>



# ORAL APPLIANCE THERAPY VS. CONTINUOUS POSITIVE AIRWAY PRESSURE

## TITLE

Efficacy versus Effectiveness in the Treatment of Obstructive Sleep Apnea: CPAP and Oral Appliances

## IMPORTANCE

As many studies only measure the efficacy (how well a therapy works in perfect conditions) of continuous positive airway pressure (CPAP) vs. oral appliance therapy (OAT), it is important to also consider the comparative effectiveness of the two treatments (how well they work in the real world). When looking at effectiveness, OAT may be a far better treatment than CPAP.

## CITATION

Sutherland K, Phillips CL, Cistulli PA. Efficacy versus effectiveness in the treatment of obstructive sleep apnea: CPAP and oral appliances. *J Dent Sleep Med*. 2015;2(4):175–181.

## SUMMARY

While CPAP is often considered more efficacious, patients tend to prefer OAT over CPAP. Also, while the efficacy of CPAP is high, the actual benefits of using the device are compromised by lack of adherence to treatment. Thus, many studies show similar improvements in health outcomes between CPAP and OAT. The commonly used efficacy measure (apnea-hypopnea index, AHI) may not be sufficient to capture real-world treatment effectiveness. Assessment of effectiveness should account for hours ON and OFF treatment. Therefore, the authors propose a new measure of effectiveness (the SARAH Index).

## WEB URL LINK

<https://aadsm.org/docs/JDSM.2.4.175.pdf>

# ORAL APPLIANCE THERAPY VS. CONTINUOUS POSITIVE AIRWAY PRESSURE

## TITLE

Titrated Mandibular Advancement versus Positive Airway Pressure for Sleep Apnea

## IMPORTANCE

The results of this study support a successfully titrated mandibular advancement device as an effective treatment for significantly reducing the sleep apnea-hypopnea index (AHI) in patients with mild to severe obstructive sleep apnea (OSA).

## CITATION

Gagnadoux F, Fleury B, Vielle B, et al. Titrated mandibular advancement versus positive airway pressure for sleep apnea. *Eur Respir J*. 2009;34(4):914-920.  
doi:10.1183/09031936.00148208

## SUMMARY

This 8-week multi-site, randomized crossover study compared oral appliance therapy (OAT) to continuous positive airway pressure (CPAP) and included 59 patients with mild-to-severe OSA. 58.3% of patients with mild-to-moderate OSA achieved complete treatment response (defined as > 50% reduction in AHI to < 5 events h<sup>-1</sup>), as did 31.2% of patients with severe OSA. OAT and CPAP performed similarly in relation to objective daytime sleepiness, cognitive function and health-related quality of life (HRQoL). Compliance was higher with OAT and patients preferred it to CPAP. This study shows that when effectively positioned, OAT is effective for patients with mild-to-severe OSA.

## WEB URL LINK

<http://erj.ersjournals.com/content/34/4/914.long>

# ORAL APPLIANCE THERAPY VS. CONTINUOUS POSITIVE AIRWAY PRESSURE

## TITLE

Mandibular Advancement Splints and Continuous Positive Airway Pressure in Patients With Obstructive Sleep Apnoea: A Randomized Cross-Over Trial

## IMPORTANCE

This study shows that not only is oral appliance therapy (OAT) an effective alternative to continuous positive airway pressure (CPAP), it also shows that patients prefer OAT over CPAP.

## CITATION

Tan YK, L'Estrange PR, Luo YM, et al. Mandibular advancement splints and continuous positive airway pressure in patients with obstructive sleep apnoea: A randomized cross-over trial. *Eur J Orthod*. 2002;24(3):239-249. doi:10.1093/ejo/24.3.239

## SUMMARY

This study was a prospective, randomized, cross-over trial of 24 patients. All had mild-to-moderate obstructive sleep apnea (OSA). Patients were randomly assigned to OAT and CPAP and used each for 2 months, with a 2-week washout in between. Average apnea-hypopnea index (AHI) at the beginning was 22.2 – average AHI decreased to 3.1 with CPAP and 8.0 with OAT. The authors found no statistical difference between these two treatments. Furthermore, 17 out of the 21 subjects who completed both treatments preferred OAT over CPAP.

## WEB URL LINK

<https://academic.oup.com/ejo/article/24/3/239/542305?login=true>

# ORAL APPLIANCE THERAPY VS. CONTINUOUS POSITIVE AIRWAY PRESSURE

## TITLE

Oral Appliance Versus Continuous Positive Airway Pressure in Obstructive Sleep Apnea Syndrome: A 2-Year Follow-up

## IMPORTANCE

Oral appliance therapy (OAT) is a viable first-line alternative to continuous positive airway pressure (CPAP) for those with mild-to-moderate obstructive sleep apnea (OSA).

## CITATION

Doff MHJ, Hoekema A, Wijkstra PJ, et al. Oral Appliance versus continuous positive airway pressure in obstructive sleep apnea syndrome: A 2-year follow-up. *Sleep*. 2013;36(9):1289-1296. doi:10.5665/sleep.2948

## SUMMARY

The authors conducted “a cohort study of a previously conducted randomized clinical trial” with 103 patients who had OSA. After 2 years, the researchers found that the percentage of mild-to-severe patients effectively treated did not differ between OAT and CPAP. While CPAP was more effective at reducing the AHI and improving oxyhemoglobin saturation levels, there was no significant difference between the two treatments when it came to health perceptions, sleepiness and functional outcomes. The authors concluded that OAT is a viable alternative for those with mild-to-moderate OSA and in severe patients if CPAP therapy fails.

## WEB URL LINK

<https://academic.oup.com/sleep/article/36/9/1289/2453867?login=true>



# COMBINATION OAT-CPAP THERAPY



The problem develops when the soft tissue at the back of the throat collapses during sleep, blocking the airway. This leads to breathing cessation for brief periods, gasping for air, difficulty staying asleep, and all the problems of daytime sleepiness, from poor job performance to fatal accidents.



- DR. RAJIV JOHAR  
LIJMC - NORTHWELL HEALTH  
CHIEF - CARDIOTHORASIC SURGERY

# COMBINATION OAT-CPAP THERAPY

## TITLE

Combining MAD And CPAP as an Effective Strategy for Treating Patients With Severe Sleep Apnea Intolerant to High-Pressure PAP and Unresponsive to MAD

## IMPORTANCE

This study may show that combining oral appliance therapy (OAT) and (CPAP) can be an effective therapy for patients who are resistant to both treatments.

## CITATION

Liu HW, Chen YJ, Lai YC, et al. Combining MAD and CPAP as an effective strategy for treating patients with severe sleep apnea intolerant to high-pressure PAP and unresponsive to MAD. Kou YR, ed. *PLoS One*. 2017;12(10):e0187032. doi:10.1371/journal.pone.0187032

## SUMMARY

This study examined the use of combination therapy in patients with severe apnea, who were resistant to both CPAP and OAT. Patients who were intolerant to CPAP were switched to OAT for 12 weeks. If residual AHI remained, the patient was then switched to combination therapy for 12 weeks. In the end, a total of 14 patients were included in this retrospective study. The researchers found that residual AHI was lower on combination therapy than on CPAP or OAT. Furthermore, patients used combination therapy for  $6.4 \pm 1.5$  hr/night median at the follow-up (36.5 months). Overall, combining OAT and CPAP was effective for these patients.

## WEB URL LINK

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0187032>

# COMBINATION OAT-CPAP THERAPY

## TITLE

A Descriptive Report of Combination Therapy (Custom Face Mask for CPAP Integrated With a Mandibular Advancement Splint) for Long-Term Treatment of OSA With Literature Review

## IMPORTANCE

This study sheds light on who might benefit most from combination therapy, specifically with a custom face mask. Continuous positive airway pressure (CPAP) monotherapy failures tend to have the greatest success with combination therapy using a custom face mask.

## CITATION

Prehn RS, Swick T. A descriptive report of combination therapy (custom face mask for CPAP integrated with a mandibular advancement splint) for long-term treatment of OSA with literature review. *J Dent Sleep Med.* 2017;4(2):29–36.

## SUMMARY

This study looked at patients who had failed either CPAP monotherapy, oral appliance therapy (OAT) monotherapy, or combination therapy with nasal pillows. This retrospective chart review study included 75 patients. All of these patients had either failed CPAP monotherapy, OAT monotherapy or combination therapy using a TAP-PAP appliance. Of these, the custom face mask benefited those who had failed with CPAP monotherapy the most.

## WEB URL LINK

<https://www.app-nea.com/aboutus#research>

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- DR. SHYAM C. SHIVDASANI, MD

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