

Insomnia Severity and Arousal Threshold as Predictors of CPAP Adherence

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Introduction

- Obstructive sleep apnea (OSA) is a highly prevalent disorder characterized by recurrent upper airway collapse during sleep.
- In a systematic review (Luyster et al., 2010), insomnia was found to be present in 39% to 58% of patients with OSA.
 - Recent studies have found that comorbid insomnia and OSA (COMISA) results in additive impairments to patients’ sleep, daytime functioning, and quality of life
- Continuous positive airway pressure (CPAP) is the standard first-line treatment for OSA, but its effectiveness is limited by high non-adherence rates—only 30 to 70% of patients meet usage criteria of ≥4 hours per night for ≥70% of nights.
- Some studies suggest that low arousal threshold (ArTH), how easily a person awakens from sleep, and COMISA can negatively impact CPAP adherence.
- However, findings are not entirely consistent. This study aims to clarify the associations between CPAP adherence, insomnia severity, and arousal threshold.

Methods

- A retrospective review was performed of OSA patients receiving CPAP therapy (n = 32) at Thomas Jefferson University Hospital between 2023 and 2024
- Patients were included in the study if CPAP usage data, sleep study reports, and insomnia severity index (ISI) scores were available for analysis, leaving **32 patients** in our study.
- ISI and sleep study metrics were collected from electronic medical records and CPAP usage data was collected from ResMed and Philips.
- Adherence was defined as usage ≥4 hours/night for ≥70% of nights.
- Participants with an ISI score ≥15 were defined as having insomnia.
- Statistical analyses included Wilcoxon-rank-sum, Fisher’s exact, and chi-squared tests performed in R studio.

Results

Table 1. Associations between ArTH and ISI and CPAP adherence

Characteristic	N	Overall (N=32) ¹	CPAP-nonadherent (N=26) ¹	CPAP-adherent (N=6) ¹	p-value ²
ArTH	27				0.6
High		14 (52%)	11 (48%)	3 (75%)	
Low		13 (48%)	12 (52%)	1 (25%)	
ISI	18	12.89 (6.65)	14.64 (6.27)	6.75 (3.95)	0.016
¹ Mean (SD)					
² Fisher’s exact test; Welch Two Sample t-test					

- ISI was significantly associated with CPAP adherence ($p = 0.016$) with patients with higher ISI scores (more severe insomnia symptoms) being less likely to be adherent to CPAP therapy (**Table 1**).
 - Among CPAP-adherent patients (n = 6), the mean ISI was 6.75
 - Among CPAP-nonadherent patients (n=26), the mean ISI was 14.64

Table 2. CPAP usage and ISI stratified by ArTH

Characteristic	N	Overall (N=47) ¹	High ArTH (N=31) ¹	Low ArTH (N=16) ¹	p-value ²
# of Nights CPAP Used	27	18.52 (8.61)	20.57 (8.46)	16.31 (8.53)	0.2
ISI	23	13.78 (6.17)	13.20 (6.60)	14.88 (5.51)	0.7
¹ Mean (SD); n (%)					
² Wilcoxon rank sum test; Fisher’s exact test					

- There were no significant associations between ArTH level (high or low) and ISI or CPAP usage (# of nights used) (**Table 2**).
- There were no significant correlations between ISI scores and the number of nights that CPAP was utilized.
- There were no significant differences in CPAP adherence or number of nights CPAP was used between patients with OSA alone and patients with COMISA (**Table 3**).

Table 3. CPAP usage and adherence stratified by COMISA

Characteristic	N	Overall (N=24) ¹	OSA alone (N=26) ¹	COMISA (N=11) ¹	p-value ²
# of Nights CPAP Used	18	19.72 (9.29)	21.30 (10.20)	17.75 (8.22)	0.4
CPAP Adherence	16	9 (56%)	7 (70%)	2 (33%)	0.3
¹ Mean (SD); n (%)					
² Wilcoxon rank sum test; Fisher’s exact test					

Discussion

- Our findings highlight the important role of insomnia severity in predicting CPAP adherence among patients with OSA.
 - Patients with higher ISI scores were significantly less likely to meet adherence criteria, which aligns with prior study findings that insomnia symptoms can interfere with the initiation and sustained use of CPAP therapy.
 - This highlights insomnia as a potentially modifiable barrier to effective OSA treatment.
- In contrast, ArTH did not show a significant association with CPAP adherence or insomnia severity in our cohort.
 - While low ArTH has been proposed as a factor contributing to CPAP intolerance, our data suggest that its impact may be less pronounced than previously thought, or that its role requires larger cohorts to be detected.
- Similarly, COMISA did not demonstrate significant differences in adherence in this sample, though prior studies have shown that COMISA patients report poorer sleep outcomes overall.
 - These discrepancies may reflect the limited sample size, heterogeneity in insomnia phenotypes, or differences in how ArTH is measured.

Conclusion

- Insomnia severity significantly impacts CPAP adherence, with higher ISI scores linked to lower compliance.
- While no significant association was found between arousal threshold and CPAP adherence or between insomnia severity and arousal threshold, further research with larger cohorts is needed to explore these relationships more comprehensively.
 - Such work may help refine patient stratification and guide individualized management strategies in OSA care.
- Integrating tailored behavioral interventions for insomnia alongside CPAP initiation may be a cost-effective way to improve CPAP adherence and effectiveness and overall treatment outcomes in OSA patients.

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Poster Handout



References

