

SHORT COMMUNICATION ΒΡΑΧΕΙΑ ΔΗΜΟΣΙΕΥΣΗ

ARCHIVES OF HELLENIC MEDICINE 2026, 43(6):852–854
ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2026, 43(6):852–854

Seasonal compliance of females with obstructive sleep apnea A follow-up study

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Εποχιακή συμμόρφωση γυναικών ασθενών
με αποφρακτική υπνική άπνοια:
Μελέτη παρακολούθησης

Περίληψη στο τέλος του άρθρου

Key words: Adherence, Continuous positive airway pressure (CPAP), Females, Obstructive sleep apnea (OSA), Seasonal compliance

Obstructive sleep apnea (OSA) is defined as a sleep disorder characterized by recurrent episodes of partial or complete obstruction of the upper airway during sleep.¹ Typically, OSA is diagnosed when more than five apnoeic events lasting over ten seconds each, occurring during sleep. These episodes, caused by either obstruction or collapse of the upper respiratory airways, lead to transient interruptions in breathing and may result in changes in blood gas exchange, such as hypoxemia and hypercapnia, which in turn disrupt sleep continuity.² Management of apnoeic events through respiratory support systems is deemed essential in order to improve patients' health status, enhance sleep architecture, and address additional comorbidities directly associated with OSA, including cardiovascular complications,^{3,4} cognitive impairment,⁵ and non-alcoholic fatty liver disease.⁶

One of the most effective therapeutic options for OSA is the use of continuous positive airway pressure (CPAP) devices, which alleviate symptoms during sleep.⁷ CPAP is widely regarded as the most efficacious treatment for OSA,^{1,2,8} as it has been shown to improve sleep-related symptoms and, consequently, the overall quality of life. Management and treatment are closely linked to nurses, who are responsible not only for monitoring the proper implementation of therapy but also for providing patient education and psychological support.⁹ This role encompasses the delivery of high-quality standards of care and expertise to promote patient well-being, the facilitation of patient education, and the application of evidence-based clinical practices.¹⁰

OSA has traditionally been studied predominantly in male populations, and its clinical manifestations and treatment responses in females remain relatively under-researched.¹¹ Following initial research on the seasonal compliance with non-invasive ventilation in people with OSA^{12,13} the present short communication paper offers additional insights focusing specifically on females. In our study the diagnostic verification of OSA was performed using a portable type III sleep study (unattended cardiorespiratory polygraphy), selected due to limitations imposed by the COVID-19 pandemic. This procedure was implemented within the sleep clinics of two public healthcare institutions in Thessaloniki, Greece. Authorisations from both hospitals' Ethics Committees and the Bioethics Committee of the University of Western Macedonia, Greece were obtained. All enrolled people signed informed consent forms. Data were collected during scheduled follow-up outpatient visits over a twelve-month observation period and were extracted from the secure digital (SD) memory card of the CPAP devices that were brought to the clinic.

From the total 1,987 participants, 454 were female. Although disease severity did not differ significantly between genders, our analysis showed that females were older than males, with a mean age of 64.42 (± 11.86) years compared

Submitted 19.7.2025

Accepted 2.8.2025

to 61.15 (± 12.0) years ($p < 0.001$). In fact, 68.1% of female participants were over 60 years old. The duration of CPAP usage among female participants was nearly evenly split between those using the device for less than four years and those for four years or more. Table 1 displays all the relevant information. A detailed evaluation of device characteristics revealed that 64.1% ($n=291$) of the females were using an automatic CPAP (Auto-CPAP) device. In parallel, 64.3% ($n=292$) employed a nasal mask or a nasal mask with a cushion. When it comes to adherence, 55.0%

($n=252$) fully complied with the recommended daily and weekly CPAP usage guidelines, while 14.8% ($n=67$) did not fully adhere to these recommendations; the remainder exhibited intermediate levels of adherence. Seasonal variations in adherence were also notable. Although most participants maintained consistent CPAP usage throughout the year, summer season was associated with the highest rate of non-adherence, at 31.7% ($n=316$). Moreover, both the average apnea-hypopnea index (AHI) and the extent of mask leakage varied significantly among the different seasons ($p < 0.001$), trends that were consistent with those observed in the overall patient cohort.

These additional findings emphasize that factors such as advanced age, device characteristics, and environmental influences play critical roles in shaping CPAP adherence among females with OSA. Tailored strategies, especially interventions targeting the challenges encountered during summer months, may be necessary to improve long-term treatment outcomes in this often-underrepresented group.

Table 1. Demographics of females with OSA.

Variable	Category	n (n%)	χ^2 test (p-value)
Age groups	<40 years	14 (3.1)	$p < 0.001$
	40–59 years	131 (28.9)	
	≥ 60 years	309 (68.1)	
Years of CPAP use	1 year	67 (14.8)	$p < 0.001$
	2–4 years	189 (41.6)	
	>4 years	198 (43.6)	
Device type	CPAP	112 (24.7)	$p < 0.001$
	Auto-CPAP	291 (64.1)	
	Bilevel device	51 (11.2)	
Mask type	Oronasal	162 (35.7)	$p < 0.001$
	Nasal/pillow	292 (64.3)	
Seasonal compliance	Spring		$p < 0.001$
	No	138 (30.4)	
	Yes	316 (69.6)	
	Summer		$p < 0.001$
	No	144 (31.7)	
	Yes	310 (68.3)	
	Autumn		$p < 0.001$
	No	126 (27.8)	
	Yes	328 (72.2)	
	Winter		$p < 0.001$
	No	124 (27.3)	
	Yes	330 (72.7)	
Overall compliance (%)	0	67 (14.8)	$p < 0.001$
	25	41 (9.0)	
	50	47 (10.4)	
	75	47 (10.4)	
	100	252 (55.5)	

OSA: Obstructive sleep apnea, CPAP: Continuous positive airway pressure

ΠΕΡΙΛΗΨΗ

Εποχιακή συμμόρφωση γυναικών ασθενών με αποφρακτική υπνική άπνοια: Μελέτη παρακολούθησης

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Αρχεία Ελληνικής Ιατρικής 2026, 43(6):852–854

Η αποφρακτική υπνική άπνοια (OSA) έχει μελετηθεί εκτενώς στους άνδρες, με περιορισμένα όμως δεδομένα για τις γυναίκες. Η παρούσα μελέτη επικεντρώνεται στη συμμόρφωση των γυναικών στη μη επεμβατική αναπνευστική υποστήριξη, αναλύοντας δεδομένα από 454 γυναίκες σε σύνολο 1.987 ασθενών με OSA. Αν και η βαρύτητα της νόσου δεν διέφερε σημαντικά μεταξύ των φύλων, οι γυναίκες ήταν μεγαλύτερες σε ηλικία ($64,42 \pm 11,86$ έτη έναντι $61,15 \pm 12,0$, $p < 0,001$), με το 68,1% να είναι ηλικίας >60 ετών. Το 64,1% χρησιμοποιούσε συσκευή Auto-CPAP και το 64,3% προτιμούσε ρινική μάσκα ή ρινικό μαξιλαράκι. Πλήρη συμμόρφωση παρουσίασε το 55% των γυναικών, ενώ 14,8% δεν πληρούσαν τα κριτήρια. Η εποχική μεταβλητότητα επηρέασε τη χρήση της συσκευής, με τη μη συμμόρφωση να κορυφώνεται το καλοκαίρι (31,7%). Παρατηρήθηκαν επίσης σημαντικές εποχικές διακυμάνσεις στον δείκτη άπνοιας-υπόπνοιας και στις διαρροές της μά-

σκας ($p < 0,001$). Τα ευρήματα τονίζουν την ανάγκη για στοχευμένες παρεμβάσεις ειδικά στις γυναίκες, ιδιαίτερα κατά τους θερινούς μήνες.

Λέξεις ευρετηρίου: Αποφρακτική υπνική άπνοια (OSA), Γυναίκες, Εποχιακή συμμόρφωση, Συμμόρφωση στη θεραπεία, Συνεχής θετική πίεση αεραγωγών (CPAP)

References

1. BENJAFIELD AV, AYAS NT, EASTWOOD PR, HEINZER R, IP MSM, MORRELL MJ ET AL. Estimation of the global prevalence and burden of obstructive sleep apnoea: A literature-based analysis. *Lancet Respir Med* 2019, 7:687–698
2. LV R, LIU X, ZHANG Y, DONG N, WANG X, HEY ET AL. Pathophysiological mechanisms and therapeutic approaches in obstructive sleep apnea syndrome. *Signal Transduct Target Ther* 2023, 8:218
3. GOTTLIEB DJ. Sleep apnea and cardiovascular disease. *Curr Diab Rep* 2021, 21:64
4. YEGHIAZARIANS Y, JNEID H, TIETJENS JR, REDLINE S, BROWN DL, ELSHERIF N ET AL. Obstructive sleep apnea and cardiovascular disease: A scientific statement from the American Heart Association. *Circulation* 2021, 144:e56–e67
5. DUNIETZ GL, CHERVIN RD, BURKE JF, CONCEICAO AS, BRALEY TJ. Obstructive sleep apnea treatment and dementia risk in older adults. *Sleep* 2021, 44:zsab076
6. KROLOW GK, GARCIA E, SCHOOR F, ARAUJO FBS, CORAL GP. Obstructive sleep apnea and severity of nonalcoholic fatty liver disease. *Eur J Gastroenterol Hepatol* 2021, 33:1104–1109
7. CAO MT, STERNBACH JM, GUILLEMINAULT C. Continuous positive airway pressure therapy in obstructive sleep apnea: Benefits and alternatives. *Expert Rev Respir Med* 2017, 11:259–272
8. TORTORA GJ, DERRICKSON BH. *Principles of anatomy and physiology*. 15th ed. John Wiley & Sons, Hoboken, NJ, 2018
9. EL ARAB RA, SANCHEZ-DE-LA-TORRE M, VALENZUELA-PASCUAL F, RUBINAT-ARNALDO E, BLANCO-BLANCO J, RUBI-CARNACEA F ET AL. Nursing professionals' role in the comprehensive management of obstructive sleep apnoea: A literature review. *Appl Sci* 2023, 13:3516
10. NURSING MIDWIFERY COUNCIL. The code: Professional standards of practice and behaviour for nurses, midwives and nursing associates. NMC, London, 2018
11. BIXLER EO, VGONTZAS AN, LIN HM, TEN HAVE T, REIN J, VELA-BUENO A ET AL. Prevalence of sleep-disordered breathing in women: Effects of gender. *Am J Respir Crit Care Med* 2001, 163:608–613
12. KARAGIANNIS A, TZITIRIDOU M, KAFKIA T, KOURAKOS M. Monitoring seasonal compliance of patients with obstructive sleep apnea using CPAP systems via SD card. *Acta Inform Med* 2023, 31:96–101
13. KARAGIANNIS A, KAFKIA T, TZITIRIDOU M, KOURAKOS M. A multivariate study on the adherence with non-invasive ventilation in people with obstructive sleep apnea. *Acta Inform Med* 2024, 32:37–42

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