



Letter

Association between obstructive sleep apnea and atopy in adult Maltese patients

The worldwide increase in the prevalence of obesity influences the development and clinical expression of various conditions, including asthma¹ and obstructive sleep apnea (OSA).² The association between OSA and atopic conditions has been minimally studied. The association between obesity and atopy is controversial, with conflicting reports.^{2–4} Obesity is associated with an increased prevalence of asthma and poorer control of this disease⁵ and increased prevalence of rhinitis and atopic dermatitis.^{6,7} Asthma symptoms are said to improve after the use of continuous positive airway pressure (CPAP).⁸ The primary objectives of this retrospective, observational study were to study the prevalence of asthma, allergic rhinitis, and atopic dermatitis in Maltese patients diagnosed as having OSA using the International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire⁹ and to identify whether there is an association between OSA and atopic conditions. The secondary objective was to study the influence of CPAP on these conditions.

Patients older than 18 years who underwent polysomnography in 2013 at Mater Dei Hospital in Malta, the only tertiary referral center in Malta, were contacted and asked to complete a telephone questionnaire. The questionnaire included demographic data and the validated ISAAC questionnaire, including questions about asthma, allergic rhinitis, and eczema.⁹ Details about the sleep study were obtained from the sleep laboratory. Adherence with CPAP was defined as its use for at least 3 hours per night on most days. Permission was obtained from the University of Malta Research Ethics Committee and from the patients' caring physicians. Statistical analysis was performed using SPSS statistical software, version 21 (SPSS Inc, Chicago, Illinois). Independent-samples *t* test, Mann-Whitney *U* test, and a logistic regression model were used. $P < .05$ was taken to be statistically significant.

A total of 126 patients (77% males; 23% females) diagnosed as having OSA during the year 2013 participated in the study. The mean (SD) age was 58 (10.5) years, mean (SD) body mass index was 38.5 (10), mean (SD) apnea-hypopnea index (AHI) was 40.7 (27) per hour, and mean (SD) oxygen desaturation index was 36.5 (28) per hour. A positive correlation between AHI and oxygen desaturation index was observed ($r = 0.88$, $P < .001$).

CPAP was recommended for all patients. Of the 73 patients (58%) who started CPAP at some point, only 55 (77%) admitted to being adherent. The most common interface used was a full face mask in 48.6%, followed by a nasal mask in 31.4% and nasal pillows in the rest of the patients. The severity of OSA (AHI) was significantly associated with patients opting to use CPAP ($P = .02$).

Of the 126 patients diagnosed as having OSA, 45 (36%) reported wheezing ever, 54 (41%) reported sneezing, runny nose, or blocked nose when not having a cold or flu ever, and 23 (18%) had a 6-month history of itchy rash ever. A total of 28 (22.2%) had a previous diagnosis of asthma, 31 (24.6%) had a previous diagnosis of allergic rhinitis, and 12 (9.5%) had a previous diagnosis of atopic dermatitis. The severity of OSA (AHI) was associated with an increased prevalence of wheezing ever ($P = .04$). There was no association between AHI and the presence of allergic rhinitis and atopic dermatitis ever.

Table 1 lists the atopy-related symptoms in the 55 patients adherent to CPAP. Patients using CPAP were more likely to report current wheezing (odds ratio [OR], 3.17; 95% confidence interval [CI], 2.11–7.2; $P = .04$), exercise-induced wheezing (OR, 3.95; 95% CI, 2.11–10.2; $P = .04$), and current rhinitis (OR, 2.1; 95% CI, 1.21–4.67; $P = .01$). Correlations with the presence of atopic dermatitis did not reach statistical significance. These were corrected for the use of humidifiers in the CPAP machines and adherence.

A substantial portion of our patients diagnosed as having OSA, an obese population, had symptoms related to atopic conditions at some point in their life and approximately one-fifth had already been diagnosed as having asthma or rhinitis. Our study identified an association between the presence of OSA and wheezing ever. International studies have identified an increased prevalence of OSA in patients with asthma.¹⁰ Undiagnosed or inadequately treated OSA is said to possibly adversely affect control of asthma and vice versa.⁸

In our study, no association was identified for the presence of OSA, allergic rhinitis, and dermatitis. International studies are limited. Obesity has been positively associated with the presence of atopic diseases in Chinese adults, specifically with atopic dermatitis and rhinitis.⁷ Because our study was retrospective, we are unable to conclude whether OSA predisposes patients to atopic dermatitis at a later stage.

The interaction between obesity and atopy, although inconsistent, cannot be ignored in clinical practice.³ Clinical studies suggest that asthma in obese individuals may differ from the classic phenotype of the disease.⁴ The mechanisms by which obesity can influence airway function and make asthma more difficult to control remain uncertain.⁵ Obesity might induce systemic inflammation, influencing pulmonary inflammatory mechanisms.⁴

When studying the effects of CPAP, our patients were more likely to experience current wheezing and exercise-induced wheezing. Available studies reveal results contrary to our findings. Long-term use of CPAP therapy improved asthma outcomes in patients with asthma and sleep apnea.⁸ Our patients receiving CPAP were also more likely to experience current rhinitis. International

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Table 1
Atopy Symptoms Among 55 CPAP Users

Symptom	Symptoms ever, No. (%)	Symptoms in the past 12 months, No. (%)
Wheezing	29 (52.7)	13 (23.6)
Sneezing, runny nose, or blocked nose	24 (43.6)	21 (38.2)
Itchy rash	14 (25.5)	11 (20.0)

studies are also limited in this field. Awareness of this possible risk is important clinically because CPAP adherence may be low because of adverse nasal effects. No association was found between CPAP use and atopic dermatitis.

These findings have important clinical implications in that patients with OSA should be screened, assessed, and treated for atopy, especially asthma and upper airway symptoms. Uncontrolled asthma and allergic rhinitis might result in lack of adherence with CPAP, with a negative effect on the patients' overall health status. We hypothesize that the increased upper and lower airway airflow secondary to CPAP might alter airway dynamics, thus resulting in an increase in airway inflammation.

The prevalence of atopy is common in OSA, and a significant association was observed between OSA and wheezing. Use of CPAP is a predictor for increased atopic symptoms. These results will help sleep specialists recognize atopy early and avoid progression of symptoms. The ISAAC questionnaire might be a simple useful tool to help make the diagnosis of atopy in such patients.

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