Sleep and Allergic Rhinitis

J Mullol,1,2,3,4 M Maurer,4,5 J Bousquet 4,6,7

1 Rhinology Unit and Smell Clinic, ENT Department, Hospital Clínic, Barcelona, Spain
2 Clinical and Experimental Respiratory Immunoallergy (IRCE), IDIBAPS, Barcelona, Spain
3 Spanish Network of Centers for Biomedical Research on Respiratory Diseases (CibeRes), Spain
4 GA²LEN (Global Allergy and Asthma European Network), supported by EU Framework Programme for Research, Contract No FOOD-CT-2004-506378
5 University Hospital Charité, Berlin Medical University, Department of Dermatology and Allergy, Berlin, Germany
6 University of Montpellier, Montpellier, France
7 INSERM, France

Abstract

Patients with chronic diseases, including chronic respiratory diseases, usually have considerably impaired sleep quality that may increase the frequency of exacerbations and severity of symptoms, lead to difficulty in patient management, and reduce quality of life (QOL). During the last few decades, several studies have shown that, in addition to the classic signs of sneezing, nasal itching, rhinorrhea, and nasal obstruction, allergic rhinitis has an important impact on the QOL of adults and children. In 2001, the ARIA (Allergic Rhinitis and its Impact on Asthma) report based its new severity classification on the impact of rhinitis on QOL, with the inclusion of sleep disturbances. Thus, allergic rhinitis patients may also suffer from sleep disorders, emotional problems, as well as impairment in daily activities and social functioning. Given that sleep is fundamental for physical and mental health, the present document reviews the methods and questionnaires used to assess the quality of sleep, the importance of sleep in allergic rhinitis, impairment and improvement of sleep in allergic rhinitis by using medications (antihistamines, topical nasal corticosteroids, nasal decongestants, antileukotrienes) and, finally, the relationship between the sleep apnea syndrome with allergic rhinitis and its treatment.

Key words: Allergic rhinitis. Quality of life. Sleep. Antihistamines. Nasal corticosteroids. ARIA.

Resumen

Los pacientes con enfermedades crónicas, incluyendo las enfermedades crónicas respiratorias, suelen tener una alteración importante de su calidad del sueño lo cual a su vez puede aumentar la gravedad y exacerbaciones de sus síntomas, aumentar la dificultad en el manejo del paciente y reducir su Calidad de Vida (CdV). Durante las últimas décadas una serie de estudios han demostrado que la rinitis alérgica, además de los síntomas clásicos de estornudos, picor nasal, rinorrea, y obstrucción nasal, ejerce un impacto importante sobre la CdV tanto en adultos como en niños. En 2001, el documento ARIA (La Rinitis Alérgica y su Impacto sobre el Asma) basó su nueva clasificación de gravedad en el impacto de la rinitis en la CdV, con la inclusión de la alteración del sueño. Por tanto, los pacientes con rinitis alérgica pueden sufrir también de alteraciones del sueño, de problemas emocionales, así como de un deterioro de las actividades diarias y la función social. Dado que el sueño es fundamental para la salud física y mental, este artículo revisa los métodos y cuestionarios para determinar la calidad del sueño, la importancia del sueño en la rinitis alérgica, el deterioro y la mejoría del sueño en la rinitis alérgica tras el uso de medicación (antihistamínicos, corticoides tópicos nasales, descongestionantes nasales, antileucotrienes) y, finalmente, la relación entre el Síndrome de la Apnea del Sueño con la rinitis alérgica y su tratamiento.


Quality of sleep is crucial for physical and mental health. Chronic diseases usually have an important impact on the quality of sleep and this can increase symptom exacerbations and severity, lead to more difficult patient management, and reduce quality of life (QOL) [1]. Allergic disorders affect up to 40% of the general population in developed countries and this prevalence is increasing. Their effect on sleep can impair a patient’s quality of life [2-6].

It has been 40 years since Cottle suggested that “sleeping patterns are in great measure dependent on good nasal
function” [7]. Allergic rhinitis is one of the major causes of impaired nasal function. It is caused by airborne particles that affect people who are allergic to them [8], and its symptoms are brought about by the activation of mast cells, basophils, and other proinflammatory cells of the nasal mucosa [9]. It is now recognized that the symptoms reported by patients with allergic rhinitis comprise more than the classic symptoms of sneezing, rhinorrhea, and nasal obstruction. Impairments in performance of daily activities and QOL affect both adults [10] and children, and patients may also suffer from sleep disorders, emotional problems, and impaired social functioning [11].

Methods to Assess the Quality of Sleep

Objective and subjective instruments are available to measure the extent to which the sleep of affected patients is compromised [12].

Disease-specific QOL questionnaires, such as the Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ), are widely used to assess the impact of the disease on health, and many include questions on sleep [13-16]. Both generic and disease-specific QOL questionnaires, together with an evaluation of symptoms, have been used in clinical trials to obtain information on the effect of medication. However, it is not only the disease that can adversely affect health-related quality of life; therapy, although intended to be beneficial, may also impair health. Questionnaires with strong evaluative and discriminative measurement properties, such as the Nocturnal Rhinoconjunctivitis Quality of Life Questionnaire (NRQLQ) [17], have been specially designed to measure the functional problems that are most troublesome to patients with nocturnal allergic rhinoconjunctivitis. In patients with nocturnal allergic rhinoconjunctivitis, the use of the NRQLQ in clinical practice and research enables us to measure the most troublesome functional impairments. An analysis of sleep quality reveals aspects of allergic rhinitis that cannot be established by analyzing daytime symptoms.

Available objective measurements include polysomnography, the Multiple Sleep Latency Test, the Maintenance of Wakefulness Test, and learning and performance testing [12], and these allow us to assess the effects of allergic rhinitis on sleep.

Sleep in Patients With Allergic Rhinitis

The effect of rhinitis on a patient goes beyond specific anterior nasal symptoms. Nasal obstruction can cause sleep disturbances that reduce a patient’s daytime concentration and lead to daytime sleepiness [18]. Consequently, many patients complain of an impaired social life [19]. Disease-specific QOL questionnaires show how sleep is impaired in a similar fashion to other dimensions [15,20].

Changes in daytime sleepiness, QOL and objective sleep patterns in seasonal allergic rhinitis have been extensively studied in a controlled clinical trial [19] involving 25 patients with seasonal allergic rhinitis and 25 healthy volunteers. The authors assessed daytime sleepiness and QOL using the Epworth Sleepiness Scale and the SF-36, and nighttime sleep using polysomnography before and during the pollen season. Statistically significant differences between groups were found for daytime sleepiness and selected QOL parameters—both were related to the severity of the disease. Statistically significant differences were also found for other parameters, although these were minimal and all values fell within normal ranges.

Bousquet et al [21] studied the severity of allergic rhinitis in 3052 primary care patients using the ARIA classification and observed that mild intermittent rhinitis affected 11% of patients, mild persistent rhinitis affected 8%, moderate-severe intermittent affected 35%, and moderate-severe persistent affected 46%. The impact of the severity of rhinitis on QOL—including sleep, daily activities, and work performance—was shown to be stronger than the duration of rhinitis. Over 80% of the patients with moderate-severe rhinitis reported impaired activities compared with only 40% of patients with mild rhinitis. A national controlled cross-sectional epidemiological study involving 260 French otolaryngologists and allergologists and 591 patients with allergic rhinitis of at least 1 year’s duration assessed sleep disorders, quality of sleep, and allergic rhinitis using validated tools (Sleep Disorders Questionnaire, Epworth Sleepiness Scale, and Score for Allergic Rhinitis) [22]. The severity of allergic rhinitis was assessed using the ARIA classification. The impact of the severity of rhinitis, but not its frequency, was significant for insomnia, severe insomnia, hypersomnolia, respiratory arrest, observed apnea, sleepiness, and regular use of sedatives.

Poorly controlled symptoms of allergic rhinitis may also contribute to sleep loss or disturbances [23,24], secondary daytime fatigue, and decreased overall cognitive functioning.

Leger et al [22] revealed that 43.7% of allergic rhinitis patients reported a feeling of fatigue on awakening despite a normal night’s sleep. Headache on awakening, anxiety, and depression as “sleep-blockers,” and daytime somnolence were significantly more frequently reported by patients with allergic rhinitis than by controls. The severity of allergic rhinitis significantly influenced the mean duration of nocturnal sleep, the frequency of daytime sleepiness, and sleep latency.

The reasons for poor sleep in allergic rhinitis are not clearly understood, but may be related, at least in part, to nasal congestion [25]. Several studies have shown the relationships between allergic rhinitis and nasal obstruction and abnormal breathing during sleep [26].

Allergic rhinitis is a risk factor for habitual snoring in children [27,28]. The Childhood Asthma Prevention Study (CAPS) attempted to determine the role of allergic rhinitis in snoring and found that, in children with symptoms of rhinitis at age 5 years (n = 219 out of 516 cohort members), 127 (60%) snored and 56 (26%) snored more than 3 times per week [29]. Snoring was significantly more common in patients with rhinitis than in controls [22].

Interestingly, a recent study on the role of perennial noninfectious rhinitis in the development of sleep disturbances in patients with asthma found rhinitis to be an important, independent risk factor for difficulty in
Impairment of Sleep by Medication

Because of their effect on central H<sub>1</sub> receptors, H<sub>1</sub> histamines are classically associated with central nervous system effects such as sedation. Although the patient does not always perceive these effects, they are evident with objective performance testing, and positron emission tomography scanning has directly demonstrated central H<sub>1</sub> receptor occupancy. First-generation H<sub>1</sub> antihistamines have been shown to cause subjective drowsiness and objective performance impairment [31-33], and have been a cause for concern among patients with safety-critical occupations [34]. Second-generation H<sub>1</sub> antihistamines reduce central H<sub>1</sub> receptor occupancy and considerably reduce or eliminate sedative effects. Therefore, CNS effects are avoidable, and first-generation H<sub>1</sub> antihistamines should no longer be used in the management of allergic rhinitis when nonsedative drugs are available [35].

The second-generation H<sub>1</sub> antihistamines desloratadine and fexofenadine have proven to be almost free of adverse effects in terms of subjective sleepiness, daytime sleep latency, and psychomotor performance. These findings support the use of antihistamines in patients involved in activities requiring increased attention (skilled work, driving).

Decongestants decrease nasal congestion but their effect on sleep has not been adequately studied. Antihistamine-decongestant combinations are used routinely for the treatment of seasonal allergic rhinitis. Insomnia has been reported in trials using oral pseudoephedrine combined with an H<sub>1</sub> receptor antagonist [39-42].

Use of Medication to Improve Sleep in Patients With Allergic Rhinitis

Intranasal corticosteroids reduce congestion, improve sleep and sleep problems, and reduce daytime sleepiness, fatigue, and inflammation. These include budesonide [43-46], flunisolide, triamcinolone acetonide [47], fluticasone propionate [48], and fluticasone furoate [49]. There is a correlation between the reduction in nasal congestion and the improvement in sleep and daytime somnolence [50]. In one study, 20 patients with allergic rhinitis and symptoms of daytime sleepiness underwent therapy with flunisolide, which significantly improved sleep quality and congestion, although not daytime sleepiness [51]. In another study [48], fluticasone propionate improved nasal congestion and quality of sleep; however, there were no significant changes in objective sleep measurements recorded using polysomnography.

Oral H<sub>1</sub> receptor antagonists have been shown to improve sleep and QOL in studies using generic [52] or disease-specific QOL instruments [53-54]. Montelukast has proven effective in the treatment of the nighttime symptoms of seasonal allergic rhinitis [55]. These symptoms were evaluated as an average of 3 individual symptom scores—difficulty falling asleep, nighttime awakening, and nasal congestion on awakening—in 7 multicenter, double-blind, parallel-group trials. Adult patients were randomized to receive montelukast 10 mg (n = 1751), placebo (n = 1557), or loratadine 10 mg (n = 1616). Changes from baseline in the nasal symptom score (mean [SE]) were –0.28 (0.01), –0.16 (0.01), and –0.24 (0.01) for the montelukast, placebo, and loratadine groups, respectively. The changes in least-squares mean from baseline were –0.11 (95% confidence interval [CI], –0.14 to –0.08; P < .001) for montelukast and –0.09 (95% CI, –0.12 to –0.06; P < .001) for loratadine compared with placebo. The nasal symptom score and 2 of its individual symptoms showed strong baseline correlations (R > 0.70; P < .001) with the sleep domain of the RQLQ. This demonstrates the importance of measuring nighttime morbidity in patients with seasonal allergic rhinitis. Therefore, montelukast is a valid option for reducing the nighttime symptoms of seasonal allergic rhinitis.

Sleep Apnea Syndrome

There is an increased prevalence of perennial allergic rhinitis in patients with the obstructive sleep apnea syndrome (OSAS).

Nasal obstruction, enlarged adenoids and tonsils, and an elongated face cause reduced upper airway size and, thus, increase the risk of OSAS. Allergic rhinitis appears to increase the risk of OSAS in children. Adequate treatment of allergic rhinitis can reduce the severity of OSAS and prevent the emergence of an elongated face, which predisposes patients to OSAS. It may also reduce the severity of existing OSAS.

Intranasal fluticasone is of benefit to some patients with OSAS and rhinitis. Data suggest that this form of nasal obstruction may contribute to the pathophysiology of OSAS [57].

First-line treatment for OSAS is usually based on nasal continuous positive airway pressure (CPAP). However, nasal CPAP can induce nasal discomfort to such an extent that as many as 50% of patients are unable to tolerate therapy. In addition, nasal CPAP has induced early nasal inflammation [58], while nasal airway obstruction correlated with CPAP tolerance [59]. Using nasal peak inspiratory flow measurements has revealed the efficacy of adding heated humidification during nasal CPAP in the treatment of OSAS [60,61].

Based on subjective criteria (snoring loudly everyday and daytime sleepiness), sleep apnea syndrome has also been found to be more prevalent in allergic rhinitis than in controls [22].

References


Manuscript received May 5, 2008; accepted for publication June 12, 2008.

Joaquim Mullol
Unitat de Rinologia i Clínica de l’Olfacte
Servei d’ORL, Hospital Clinic
Villarroel 170, 08036 Barcelona
Catalunya, Spain
jmullol@clinic.ub.es