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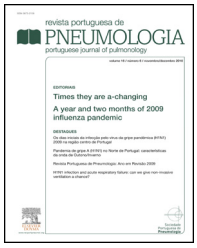

ORIGINAL ARTICLE

Insomnia as an expression of obstructive sleep apnea syndrome – the effect of treatment with nocturnal ventilatory support

M. Saldanha Mendes[a,*], **J. Moutinho dos Santos**[b]

[a] *Serviço de Pneumologia, Centro Hospitalar Cova da Beira, Covilhã, Portugal*
[b] *Centro de Medicina do Sono, Centro Hospitalar e Universitário de Coimbra, Coimbra, Portugal*

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Abstract
Introduction: Obstructive sleep apnea syndrome (OSAS) and insomnia often coexist, and it is estimated that nearly half of those who suffer from the former report symptoms of the latter. The fact that these patients have no other causes of insomnia indicates that it is a sign of OSAS.
Objective: The aim of the study is to evaluate the effectiveness of nocturnal ventilatory support (NVS) in the treatment of insomnia secondary to OSAS.
Materials and methods: In order to conduct the retrospective study, the authors reviewed the medical records of patients with insomnia and OSAS that had received NVS. Patients with psychiatric disorders, sleep movement disorders, psycho-physiological insomnia, circadian rhythm sleep disorders, inadequate sleep hygiene, use and abuse of hypnotic agents, stimulants, antidepressants, anxiolytics and alcohol, were excluded. For the selected patients, the effects of NVS in terms of clinical signs and symptoms of insomnia, apnea–hypopnea index (AHI), Epworth Sleepiness Scale (ESS) score, and number of sleep hours were analyzed, before and after treatment with NVS.
Results: After reviewing 1241 medical records, 56 patients were selected, with a mean age of 60.9 ± 10.0 years. Twenty-two (39.3%) suffered from intermediate insomnia, 19 (33.9%) had initial insomnia, eight (14.3%) had the mixed type, and seven patients (12.5%) had terminal insomnia. The majority of patients ($n = 48$; 85.7%) were treated with auto-titrating continuous positive airway pressure (APAP). Forty-four patients (78.6%) overcame insomnia; insomnia symptoms persisted in nine (16.1%), and three (5.4%) patients abandoned during the medical follow-up. There was an association between the type of insomnia and its resolution and, in percentage terms patients with the mixed type did not manage to overcome insomnia symptoms (75%).

There was a statistically significant difference between patients that overcame insomnia and those who did not in terms of the average time which elapsed between the initiation of treatment with NVS and compliance with the adherence criteria: 161 ± 61 days for the former, and 225 ± 141 days for the latter ($p = 0.003$). Before and after the NVS treatment, patients slept

* Corresponding author.
E-mail address: marianacarocha@gmail.com (M.S. Mendes).

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an average of 5.29 ± 1.37 and 6.37 ± 1.55 h per night, respectively ($p < 0.001$). Among the patients who overcame insomnia, six did not meet the treatment adherence criteria: five adhered more than 4 h/night in less than 70% of all nights (60.6 ± 3.2%), and one patient adhered less than 4 h in all nights (3.5 h/night).

Conclusion: NVS has proved effective in treating insomnia secondary to OSAS, and favorable results could be observed even in patients that did not meet the criteria of NVS adherence. Results suggest that all insomnia subtypes, except the mixed subtype, may derive from OSAS.

Introduction

Insomnia is the most common sleep disorder, and is estimated to affect 33–50% of the adult population.[1] It can manifest itself either as a primary entity or as secondary to various causes. Obstructive sleep apnea syndrome (OSAS) is the second most common sleep disorder, and can be found in 4% men and 2% women.[2] Although they can be perceived as opposite conditions (insomnia characterized by excessive alertness and OSAS by hypersomnolence), it has been observed that they often coexist. Previous studies have shown that 40–50% patients diagnosed with OSAS mentioned significant symptoms of insomnia.[3–5] Other studies assessed the presence of OSAS in individuals with insomnia, observing a OSAS prevalence of 29%, 40% and 43%, to cut-off values of the apnea–hypopnea index (AHI) of 15, 10 and 5 events/h, respectively.[6,7]

Published articles about coexisting OSAS and insomnia have approached the issue as the resulting product of two etiologically diverse entities that influence one another. Chung,[8] on the contrary, has suggested that in some cases insomnia is a potential symptom of OSAS, manifesting itself secondarily to micro-awakenings. Based on these premises, the authors intend to assess the efficiency of nocturnal ventilatory support (NVS) in treating insomnia which is secondary to OSAS.

Methods

A review was conducted on the clinical files of patients diagnosed with OSAS and insomnia, who were then treated with NVS. Signs indicating insomnia were: sleep latency of 30 min or more; waking up after falling asleep and difficulty in falling asleep again for 30 min or more, or premature morning awakening for more than 30 min, more than three times a week. The use of the *Sleep Disorders Questionnaire* (SDQ) in the first consultation complemented the clinical interview on identifying patients with insomnia, and also provided information about sleep time before NVS. Epworth sleepiness scale (ESS) was evaluated as well. The OSAS diagnosis was obtained by performing a cardiorespiratory sleep study and/or a polysomnography, which allowed us to classify OSAS severity as mild (AHI: 5–15/h), moderate (AHI: 16–30/h) and severe (AHI > 30/h).[9] Patients presenting potentially insomnia inducing disorders (anxiety, depression, psychophysiological insomnia, restless legs syndrome, periodic limb movement disorder, altered circadian rhythm, substance abuse, stimulants, antidepressants, anxiolytics, sedatives and hypnotic drugs, inadequate sleep hygiene, medical condition and/or environmental factors that disturb sleep) were excluded.

All patients were treated with NVS. Subsequent consultations were held every 3–4 months, until any problems were resolved. The symptoms of insomnia were reassessed through clinical questionnaires, as well as the ESS. The ventilator records were also taken into account. Sleep time after NVS was inferred from the ventilator adherence records. Patients were considered adherent to NVS treatment if complying with more than 4 h a night in, at least, 70% of nights.[10]

The statistical analysis was performed with SPSS statistical software, version 17 (Chicago, IL). The statistical descriptions of the variables included mean and standard deviation for continuous variables, and absolute and percentage frequency for each group of a categorical variable. Comparisons between two groups were performed with the *t*-Student's test for independent samples, and with variance analysis (ANOVA) for more than two groups. Values $p < 0.05$ were considered statistically significant.

Results

After reviewing 1241 clinical files, 56 patients were selected (4.5%); their characteristics are detailed in Table 1. The four insomnia subtypes did not present statistically significant differences in terms of body mass index (BMI) (Table 1) and initial AHI (*AHI before* treatment, Table 2). In relation to ESS (Table 2), it was verified that patients with initial insomnia had a pre-treatment ESS which was significantly higher than that of patients with intermediate insomnia (14.9 ± 5.3 vs. 11.3 ± 5.1; $p = 0.028$).

Complaints of insomnia were resolved in 44 patients (78.6%), and persisted in 9 (16.1%); 3 (5.4%) abandoned the follow-up. Overall, the time required for compliance with NVS treatment was of 171 ± 84 days. Among patients who overcame insomnia, 41 (93.2%) proved to be compliant with NVS and reported resolution of insomnia complaints simultaneously in the same subsequent appointment (after 150 ± 63 days of treatment). In three cases, there was a discrepancy of 120 ± 51 days between the appointment in which the compliance with treatment was targeted (after 165 ± 54 days of treatment), and the appointment in which