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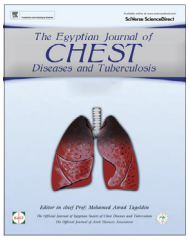

ORIGINAL ARTICLE

Overlap syndrome: Association of chronic obstructive pulmonary disease and obstructive sleep apnea syndrome

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KEYWORDS

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Abstract COPD and the OSAHS are both common diseases affecting respectively 10% and 5% of the adult population over 40 years of age. Their coexistence, which is denominated as «overlap syndrome», can occur in about 0.5% of this population.

Aim and materials: To assess the existence of a prevalence of OSAHS in patients with COPD through a prospective analysis: 70 had a confirmed isolated OSAHS (group A) and 11 had an OS (group B), all were compiled from January 2007 to June 2012.

Results: The prevalence of OS in our study was 13.6%, OS patients were older than the isolated OSAHS patients ($p < 0.05$) with a male predominance in the Overlap arm ($p < 0.05$), and BMI was similar between the 2 groups ($p = 0.22$). Tobacco is retained as a risk factor and 81.8% of patients with Overlap were smoking ($p < 0.05$). Clinical signs most reported are nocturnal snoring and daytime sleepiness. The Epworth Sleepiness Scale was higher than 10 in the 2 groups ($p < 0.05$). The Berlin questionnaire realized in 30 subjects in group A, was positive (40% of cases) and was positive in 63.6% of 7 subjects in group B. Spirometry showed that vital capacity, FEV1 and FEV1/CV were significantly decreased in the Overlap group ($p < 0.001$). The recording shows a sleep apnea–hypopnea index (AHI) similar in the two groups ($p < 0.05$).

Conclusion: There was no correlation between COPD and OSAHS. The latter is a risk factor for the first.

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Introduction

COPD and OSAHS are very common conditions, and thus we can expect that many subjects can simultaneously have COPD and OSAHS by chance alone without one being a predisposing condition for the development of other [1].

The authors thought that COPD favored the presence of OSAHS [2], because the prevalence of OSAHS appeared higher in COPD than in the general population [3] and because some etiological factors were considered as common to the two conditions, like smoking. It was in fact suppositions from studies that did not have a real epidemiological basis [3], and the role of tobacco was evident in COPD, but less evident in OSAHS.

It was necessary to wait until 2003 and the publication of Sanders et al. [4] of the results of the Sleep Heart Health Study (SHHS), so that we finally have solid epidemiological data (5954 participants) on the coexistence of COPD and OSAHS. These results were complemented in 2005 by the Polish study of Bednarek et al. [5] that examined 676 volunteers from the general population.

Aim and material

The aim of our study was to assess the prevalence of OSAHS in patients with COPD through a prospective analysis: 130 patients referred for suspected sleep apnea have been sleep recorded. Subjects should have more than 30 years and have no history of being treated with CPAP for OSAHS or to have received oxygen therapy.

Obstructive airway disorder synonymous term COPD was defined by a FEV/FVC less than 70%. The diagnosis of OSAHS was established according to the criteria of the American Academy of Sleep Medicine. All patients recruited into the study were approved consent. 70 had isolated OSAHS confirmed (group A) and 11 had the association of OSAHS and COPD (group B), the other 49 patients (necessarily to be OSA+ and COPD−, or OSA− and COPD+) have not been the object of this study that was done on a period of five years and a half.

Methods

All of these epidemiological, clinical and paraclinical data has been collected on a preset farm return. Statistical analysis was performed using SPSS software version 10.0 compatible with Windows. Values <0.05 were considered statistically significant.

Results

Epidemiological data

The mean age of patients was 45.73 years ± 11.47 years in group A versus 54.18 $\pm$ 7.79 years in group B. The statistical difference was significant. A female predominance (57.2%) was observed in group A versus a male predominance in group B.

Clinical data

Tobacco is retained as a risk factor, 81.8% of patients OS were smokers, with a difference that is statistically significant ($p < 0.001$). The clinical signs most reported similarly in both groups are clinical signs of OSA. The scale of quality of life was altered in 59 patients (84.3%) from group A and all patients in group B. The statistical difference between groups was not significant ($p = 0.34$). The Epworth sleepiness scale was greater than 10 in favor of excessive daytime sleepiness in 41 patients (58.6%) from group A and 8 subjects (72.7%) from group B. The statistical difference between groups was not significant ($p = 0.38$). The Berlin Questionnaire (BQ) used to evaluate the clinical probability of OSA was performed in 30 patients of group A and was positive (at least two positive categories) in 28 subjects (40%) for a high probability of sleep apnea, while in group B: 7 subjects had a positive BQ (63.6%). The body mass index (BMI) was similar in both groups ($p = 0.22$).

Paraclinical data

Spirometry: The results are schematized in Table 1.

Polygraphic and/or polysomnographic recording:

The choice was based on the clinical context primarily guided by the clinical suspicion (missing or loud ventilatory polygraphy, low: polysomnography). The polygraphy was performed in 70 subjects in both groups (86.42%) versus 11 patients (13.58%) who have benefited

Table 1 Spirometric results of patients with the overlap syndrome (group B) compared with patients with OSAHS isolated (group A).

Spirometry	Group A, Number (%)	Group B, Number (%)	*p*
Normal	55 (78.6)	0	
FVC (% predicted)	87.05 ± 14.32	78.28 ± 8.59	0.01
FEV (l)	2.82 ± 0.58	1.49 ± 0.22	<0.001
FEV (% predicted)	88.03 ± 14.62	59.63 ± 6	<0.001
FEV/CV (%)	85.86 ± 11.69	56.87 ± 6.43	<0.001

Table 2 Results of the sleep recording of patients with overlap syndrome (group B) compared with patients with OSAHS isolated (group A).

	Group A, Number (%)	Group B, Number (%)	*p*
AHI (events/hour)	21.8 ± 15.8	21.05 ± 8.74	0.88
Severity of OSAHS			0.53
• Mild	28 (40)	2 (18.2)	
• Moderate	24 (34.3)	6 (54.5)	
• Severe	18 (25.7)	3 (27.3)	

from polysomnography. The results are schematized in Table 2.

Discussion

It was David Flenley who first used over 20 years ago, the term of overlap syndrome to describe the association of COPD and OSAHS [6]. He estimated that this association of two common diseases probably concerned many subjects. In practice, the use of the term overlap syndrome was reserved to the association of COPD and OSAHS.

Many recent epidemiological studies have concerned the prevalence of COPD and OSAHS in the general population. Obviously, studies of this type concerning overlap syndrome are much rarer. The oldest study published on 1980 by the Guilleminault group [2] which has a prevalence of OSAHS objectified equal to 92% for a series of 26 COPD patients referred to a specialist sleep center because they complained of excessive daytime sleepiness.

The studies of Bradley [7,8] and Chaouat [3] included patients in whom the diagnosis of OSAHS was put by polysomnography (respectively in 50 and 265 patients), the prevalence of COPD reached 14% in the Bradley study [8] and 11% in the Chaouat study [3]. In our study the prevalence of overlap syndrome was 13.6%. This prevalence is very different depending on the used definition. The apparent differences between the studies may be explained by differences in the selection criteria, the characteristics of the population and conception of the study [9].

We have two recent epidemiological studies of large-scale and high-quality, made in the United States [4] and Poland [5], whose objective is to appreciate the prevalence of OSAHS in COPD and verify that this prevalence is higher or not in the general population.

In the SHHS study [4] from the 5954 participants who have had home polysomnography, 1138 subjects, equal to 19% had COPD. In the American epidemiological study by American of Mannino [10], the distribution of mild, moderate and severe COPD is not very different from the SHHS.

Bednarek et al. [5] found overlap syndrome in 7 subjects, or 1% of the cohort. This percentage is roughly equivalent to that obtained on the basis of the prevalence of COPD and OSAHS in the adult population of European countries.

The results of Sanders et al. [4] do not support the hypothesis that COPD favors the coexistence of OSAHS and vice versa. If the overlap syndrome is relatively frequent, it is simply because COPD and OSAHS were very common diseases.

If COPD is present in 10% of adults over 40 years [11–13] and if the prevalence of OSAHS in the same population range is of the order of 5–10% [14–16], the overlap syndrome can be found in 0.5–1% of the population over 40 years, which is far from negligible.

A certain number of studies compare the clinical characteristics of OS patients with isolated OSA. Chaouat et al. [3] found that compared to the isolated OSAHS group, OS population tends to be older, but the BMI was similar in both groups, which was reported in the SHHS study. O'Brien and Whitman [17] found that patients with OS were also older and less obese. The participants of the Monia study are broadly comparable to the participants of the SHHS study with some differences: younger subjects in all, discreet male predominance in COPD patients, airway obstruction slightly higher in COPD. The studies conducted by Radwan [18] and Zamarron [19] found no significant difference concerned the severity of OSAHS, the mean arterial oxygen saturation during sleep, and BMI. In our study, patients with OS were also older than isolated OSA ($p < 0.05$) with a male predominance in the Overlap arm ($p < 0.05$), there are no controlled studies concerning the predominance of sex, and BMI was similar between the 2 groups ($p = 0.22$).

Association more frequent than expected by chance alone between OSAHS and COPD may be explained by the fact that the two conditions have a common etiological factor, smoking for example. However, while the role of cigarette smoke is well established in COPD [20,21], the role of smoking as a risk factor for OSAHS is discussed, considered negligible in some studies [22,23], while for other studies suggest that the cigarette smoke may increase the risk of obstructive apneas during sleep [24–26]. In our series tobacco is retained as a risk factor, 81.8% of patients with OS were smoking ($p < 0.05$).

In contrast, more recent studies concerning a series of mild COPD showed no difference in sleep quality from that of the general population of the same age. This is the case in the Lewis study [27] where COPD with nocturnal desaturation ($n = 29$) did not have a different quality of sleep without nocturnal desaturation in COPD ($n = 30$). in the SHHS study mentioned above [4] the 1138 COPD subjects (mild COPD patients on average) have no significant electroencephalographic objective perturbations of sleep if they were not associated with OSAHS, moreover, the architecture of sleep is not different in COPD patients with the FEV in the lowest quartile compared with the FEV in the highest quartile. [4].

Sanders et al. [4] also observed that OS subjects compared to subjects with isolated OSA have a most important sleepiness, a lower total sleep time, a decreased sleep efficiency and a higher arousal index. In contrast, there are virtually no differences in quality and sleep architecture between subjects with OSAHS subjects and isolated OSA [4]. In our study the Epworth Sleepiness Scale did not differ between the two groups ($p = 0.38$), so was the Berlin score used in certain patient groups.

Therefore, COPD itself does not affect the quality of sleep. It is influenced by the presence of OSAHS, which was expected, but not by the severity of airway obstruction.

The OS patients in the Chaouat study [3] had lung volumes and FEV/LVC lower than the subjects with Os recruited into the epidemiological cohorts [4,5], this is also found in our study since the CV, FEV, and FEV/CV were decreased in the group OS compared with group isolated OSA, which is quite logical because the recruitment criteria are very different and the criteria for defining COPD are not exactly the same based on the FEV/FVC in epidemiological studies [4,5] and the FEV/LVC in the Chaouat study [3]. The means ratio FEV/LVC of 30 patients was 50 ± 6%, which is significantly lower than the ratio FEV/FVC of 63.8 ± 6.6% in subjects with COPD in SHHS study [4], but this difference in the severity of airway obstruction is probably explained by the fact that Chaouat et al. [3] have explored patients with consecutive OSAHS, while the SHHS study examined on the general population. In our study the spirometric parameters were clearly reduced in the the overlap syndrome group compared to the isolated OSAHS group (see Table 1).

The most important finding of the SHHS study [4] is that IAH is not higher in COPD patients than in not COPD patients. on the contrary, the COPD participants have a mean and median AHI significantly lower than not COPD participants [4], the AHI values are identical in the two groups [4], the percentage of subjects with an AHI >10 or >15 is not higher in COPD participants, rather it is a little lower in theirs and statistically significant.

As in the SHHS study, Chaouat et al. [3] and Bednarek et al. [5] in their studies have not found more OSAHS in the COPD group than in the not COPD group.

In our study AHI was similar in the two groups ($p = 0.88$) and clinical signs of OSAHS including daytime sleepiness and the Epworth Sleepiness Scale were also similar in the both groups.

These results are not in favor of an increased prevalence of OSAHS in COPD compared with the general population without COPD. The coexistence of COPD and OSAHS is due to chance rather than a hypothetical pathophysiological link between the two affections [4].

Conclusion

We find that there is no correlation between COPD and OSAHS. The latter is a risk factor for the first.

Conflicts of interest

None.

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