

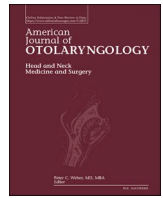


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Alteration of Auto-CPAP requirements in obstructive sleep apnea patients with COVID-19 history

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ABSTRACT

Background: Coronavirus disease 2019 (COVID-19) is an infectious disease that leads to critical respiratory problems.

Obstructive sleep apnea (OSA) is the most common sleep-associated breathing disease and is represented by repetitive experiences of constraint of the respiratory tract prompting to reduced or deficient breathing during sleep.

Auto-Continuous positive airway pressure (Auto-CPAP) is a modality of respiratory ventilation used as gold standart in the treatment of OSA.

Objective: This study was performed to conclude the alteration of Auto-CPAP levels in OSA patients who had COVID-19 history.

Methods: Nineteen OSA patients who had cured COVID-19 and used Auto-CPAP were included in this study. Nightly Auto-CPAP 95th percentile pressure (95thpp), median CPAP pressure and AHI before COVID-19 disease and one month after COVID therapy were recorded from electronic cards of Auto-CPAP devices.

Results: Before COVID infection, average Auto-CPAP 95thpp was 8.56 ± 0.17 cm H₂O. One month after COVID-19, average Auto-CPAP 95thpp was 9.78 ± 0.21 cm H₂O ($P < 0.01$). While Median CPAP pressure was 7.49 ± 0.16 cm H₂O before COVID, it was found to be 8.15 ± 0.19 cm H₂O after the disease ($P < 0.01$).

Conclusions: The increase in need of average Auto-CPAP 95thpp and median CPAP pressure in OSA patients who have had COVID-19 disease and use Auto-CPAP shows that this disease causes problems in both the lower and upper airways.

1. Introduction

Obstructive sleep apnea (OSA) is a usual disease in which is characterised with airway collapse with periodic obstruction of respiration at sleep [1]. Presently, the gold standart treatment for OSA is continuous positive airway pressure (CPAP) devices [2]. Auto-CPAP machine is an advanced form of CPAP that is constructed to automatically harmonize the volume of pressure performed on a breathe by respiration basis [3]. The perpetual coronavirus disease-19 (COVID-19) pandemic generated by severe acute respiratory syndrome coronavirus-2 has originated unpatterned problems for airway [4].

Airway problems might effect Auto-CPAP pressure necessity for OSA patients [5]. This might conduct to an raised Auto-CPAP pressure necessity. In this study, we evaluated the Auto-CPAP pressure requirement

in OSA patients with COVID-19 history.

2. Methods

Nineteen OSA patients who had previously used Auto-CPAP due to OSA and had COVID-19 history and 15 patients who had previously used Auto-CPAP due to OSA and did not have COVID-19 history were included in this prospective, observational study. This study was approved by the Local Ethical Committee. Informed consent was obtained from all subjects.

At study entry and at the end, all subjects were examined in detail. Also routine blood analyses, real-time reverse transcriptase–polymerase chain reaction (PCR) test of nasopharyngeal swab, blood tests and chest X-rays were performed in all participants.

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Each patient used a RespiroNix- Philips (PA, USA) Auto-CPAP device. The Auto-CPAP range was between 5 and 20 cm H₂O, as needed. Nights in which less than 4.5 h of use were recorded were excluded. None required additional oxygen administration. Patients who had weight change more than 10% and underwent respiratory surgery were not included in the study. Nightly Auto-CPAP 95th percentile pressure (95thpp), median CPAP pressure and AHI before COVID-19 disease and one month after COVID therapy were recorded from electronic cards of Auto-CPAP devices.

Statistical analyses were performed by managing the SPSS software, version 21.0 (SPSS Inc., Chicago, IL, USA) for Windows. Unmodulated variables are demonstrated as percentages and incessant variables are demonstrated as mean \pm SD.

Relations between two incessant variables in the group were determined with Wilcoxon rank-sum tests. Relationships of incessant variables were determined with Spearman rank correlation coefficients. Categorical variables were determined with likelihood ratio χ^2 tests. A value of $P < 0.001$ was concluded as statistically significant.

3. Results

In total, nineteen patients (mean \pm SD age 49.7 ± 11.6 years; 12 (63.2%) males, 7 (36.8%) females) who had previously used Auto-CPAP due to OSA and had COVID-19 history and fifteen age and sex matched control subjects (mean \pm SD age 45.2 ± 10.3 years; 8 (66.7%) males, 4 (33.3%) females) who had previously used Auto-CPAP due to OSA and did not have COVID-19 history were enrolled to the study ($p = 0.368$). According to the diagnostic polysomnography (PSG) results AHI values of the patients were ranged from 37 to 93/h (mean \pm SD, 56.1 ± 14.9 /h) and AHI values of the control subjects were ranged from 31 to 92/h (mean \pm SD, 53.7 ± 13.5 /h) ($p = 0.397$). Lowest SaO₂ s in study group were ranged between 58% and 89% (mean \pm SD, 74.3 ± 12.1 %) and lowest SaO₂ s in control group were ranged between 60% and 88% (mean \pm SD, 75.1 ± 11.8 %). Body mass index (BMI) in study group were ranged from 25.9 to 48.8 kg/m² (mean \pm SD, 34.8 ± 9.7 kg/m²) and BMI in control group were ranged from 24.8 to 45.3 kg/m² (mean \pm SD, 32.9 ± 9.2 kg/m²) (Table 1).

Before COVID infection, average Auto-CPAP 95thpp was 8.56 ± 0.17 cm H₂O. One month after COVID-19, average Auto-CPAP 95thpp was 9.78 ± 0.21 cm H₂O ($P < 0.01$). While median CPAP pressure was 7.49 ± 0.16 cm H₂O before COVID, it was found to be 8.15 ± 0.19 cm H₂O after the disease ($P < 0.01$).

The machine recorded AHI on the autotitrating CPAP was increased slightly after COVID-19. While pre-COVID period mean AHI value was 3.61 ± 0.09 it was found to be 3.78 ± 0.09 post-COVID period ($P = 0.271$) (Table 2).

4. Discussion

With the initiation of the COVID-19 epidemic there has been interest that patients with OSA who acquire COVID-19 may be at greater hazard of morbidity and mortality than subjects without OSA [6]. Due to the COVID-19 epidemic, the conditions of patients who already have respiratory problems are getting worse. It is known that patients with obstructive sleep apnea (OSA) are at risk for severe COVID-19 [7].

But there was limited knowledge about the impact of COVID-19 on status of OSA patients whom need CPAP use. According to the literature patients with OSA shown more sleep symptoms than the control subjects [8].

Increased OSA severeness, no intervention for OSA were allied with raised COVID-19 prevalence among subjects with OSA [9].

Also, there was significant improvement in CPAP adherence during the COVID-19 lockdown in OSA patients managed with CPAP.

In this study, there was statistically significant increase in average Auto-CPAP 95thpp, median CPAP pressure. The recorded AHI on the autotitrating CPAP was increased slightly after COVID-19 but it was not

Table 1
Demographic characteristics of subjects.

Gender	Patients with COVID-19 history (n/%)	Patients without COVID-19 history (n/%)	Total (n/%)	p
Male	12/63.2	8/66.7	20/64.5	0.293
Female	7/36.8	4/33.3	11/35.5	
AHI values (Mean \pm Standard Deviation)/ (min–max/h)	56.1 ± 14.9 / 37–93	53.7 ± 13.5 / 31–92	55.8 ± 14.1 / 31–93	0.397
Age (Mean \pm Standard Deviation)/ (min–max/years)	49.7 ± 11.6 / 32–71	45.2 ± 10.3 / 33–67	48.4 ± 11.1 / 32–71	0.115
Lowest SaO ₂ (Mean \pm Standard Deviation)/ (min–max/%)	74.3 ± 12.1 / 58–89	75.1 ± 11.8 / 60–88	74.8 ± 11.9 / 58–89	0.469
BMI (Mean \pm Standard Deviation)/ (min–max kg/m ²)	34.8 ± 9.7 / 25.9–48.7	32.9 ± 9.2 / 24.8–45.3	33.5 ± 9.4 / 24.8–48.7	0.327

AHI = apnea-hypopnea index; SaO₂ = oxygen saturation; BMI = body mass index.

Table 2
Auto-CPAP device records of subjects.

	Patients with COVID-19 history		Patients without COVID-19 history	p
	Before COVID infection	After COVID infection		
Average Auto-CPAP 95thpp (Mean \pm Standard Deviation) (cm H ₂ O)	8.56 ± 0.17	9.78 ± 0.21	8.43 ± 0.18	<0.01
Median CPAP pressure (Mean \pm Standard Deviation) (cm H ₂ O)	7.49 ± 0.16	8.15 ± 0.19	7.51 ± 0.17	<0.01
Mean AHI value (Mean \pm Standard Deviation) (/h)	3.61 ± 0.09	3.78 ± 0.09	3.69 ± 0.09	0.271

CPAP = continuous positive airway pressure; 95thpp = 95th percentile pressure; AHI = apnea-hypopnea index.

statistically significant.

Previous coronaviruses have been allied with obstructive pulmonary disease (OPD) aggravations [10]. But COVID-19 have not been demonstrated to concern OPD exacerbations.

5. Conclusion

In order to understand the long-term and permanent effects of COVID-19, it is necessary to study larger case series.

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