

PREVALENCE AND SEVERITY OF OBSTRUCTIVE SLEEP APNEA IN COPD PATIENTS UNDERGOING OUTPATIENT PULMONARY REHABILITATION: A LITERATURE REVIEW

Shayra Kellen Arantes Souza¹
Luiz Felipe Elias de Queiroz²
Brunna Ferreira Aguiar³
Ananda Camille Silva Oliveira⁴
Miriã Cândida Oliveira⁵
Luís Vicente Franco de Oliveira⁶

SUMMARY

Introduction: Chronic obstructive pulmonary disease (COPD) and obstructive sleep apnea (OSA) are significant respiratory conditions with a global impact on public health. COPD leads to chronic inflammation and respiratory difficulties, while OSA, characterized by episodes of apnea and hypopnea, affects sleep quality. **Objective:** To review the literature in order to understand the severity and prevalence of OSA in COPD patients undergoing pulmonary rehabilitation (PR). **Methodology:** Three clinical trials were extracted from the PubMed database, published between 2015 and 2024. The Health Sciences Descriptors (DeCS) used for the search were: "chronic obstructive pulmonary disease," "obstructive sleep apnea," "rehabilitation," "prevalence," and "severity," in English and Portuguese, with the boolean operator "AND." The inclusion criteria were publications in Portuguese and English, original studies, and open access. **Results:** OSA is prevalent in patients with COPD, with variations in the severity of respiratory disorders, and it was found that RP showed benefits in quality of life and control of overlap syndrome; however, factors such as body mass index and comorbidities also influence the severity of COPD. **Conclusion:** The association between COPD and OSA is common and negatively affects the quality of life of patients, and RP offers significant improvements; however, more studies are needed to strengthen the evidence and seek scientific consensus.

Keywords: Chronic obstructive pulmonary disease; obstructive sleep apnea; pulmonary rehabilitation.

1,2,3,4,5,6 E-mail contato: shayra.kas@gmail.com - Evangelical University of Goiás - UniEVANGÉLICA

Introduction

According to the World Health Organization (WHO), chronic obstructive pulmonary disease (COPD) is considered a public health problem and is the third leading cause of death worldwide. The pathology is characterized by chronic inflammation and narrowing of the respiratory tract [1], which result in muscle dysfunction, fatigue with minimal exertion, dyspnea, sputum production, and cough; in addition to daily functional limitations that compromise quality of life (QoL) [2,3].

Obstructive sleep apnea (OSA) affects around one billion people worldwide, approximately 15% of the global population, being a highly prevalent respiratory disorder [4], which impacts sleep quality due to periodic episodes of apnea and/or hypopnea [5].

The severity of OSA is quantified through the apnea-hypopnea index (AHI) over a one-hour period, which can be classified as: mild OSA, AHI between 5 to 14.9 episodes per hour; moderate, AHI between 15 to 29.9 episodes per hour; and severe, when the AHI is equal to or greater than 30 episodes per hour [6]. In patients with COPD, the presence of isolated nocturnal hypoxemia (saturation below 90%) and OSA is directly related to its severity, and consequently to the drop in nocturnal saturation [7,8].

The concomitant presence of OSA and COPD is defined as overlap syndrome (OS) [9], such that the association of both diseases in the respiratory tract results in a reduction in health-related quality of life (HRQoL), acute exacerbation of COPD, and worse sleep quality compared to individuals who only have OSA, in addition to being associated with higher cardiovascular morbidity [10]. Therefore, this study aims to conduct a bibliographic review of recent studies in order to understand the severity and prevalence of OSA in COPD patients undergoing a PRP.

Methodology

This study is characterized as a literature review. The search for articles in the MEDLINE database (accessed via PubMed) began in July 2024 and ended in August 2024, in addition to a manual search of the references of included studies. The established search criteria were studies published between 2015 and 2024, using the medical subject headings (MeSH) terms: "chronic obstructive pulmonary disease," "obstructive sleep apnea," "rehabilitation," "prevalence," and "severity," with the boolean operator "AND." The inclusion criteria were clinical trials, published in English, freely accessible, addressing the prevalence and severity of OSA in individuals with COPD who underwent pulmonary rehabilitation (PR); and the exclusion criteria were non-original studies, incomplete studies, and studies with missing data.

Results

Three clinical trials were selected that addressed the prevalence and severity of OSA in COPD patients, whether they were subjected to a PRP or not.

The study by Turcani et al. (2014) evaluated over 4 months the prevalence of OSA in 35 (51.4%) of the 101 patients hospitalized for COPD exacerbation, after stabilization of the patient's clinical condition and cessation of oxygen therapy, through polygraphy examination. The findings demonstrated that 17 individuals had an AHI below 5/h (mild) with nocturnal saturation ranging from 80% to 95%, and 18 individuals had an AHI above 5 events/hour (h) with nocturnal saturation ranging from 60% to 94%, of which 9 individuals had moderate AHI and the remaining 9 individuals had severe AHI [11].

Schreiber et al. (2018) investigated the prevalence and predictors of OSA in 422 COPD patients undergoing an inpatient PRP from 2007 to 2013, who were clinically stable regardless of the severity of the disease. After evaluation, it was possible to identify that patients with OSA have overweight or obesity; lower average nocturnal

saturation; and more severe daytime sleepiness, based on the Epworth Sleepiness Scale (ESS). The results of the polysomnography showed that 232 patients (55%) had an AHI below 15 events/hour (mild) and 190 individuals (45%) had severe AHI, and therefore underwent treatment for OSA. At the end of the PRP, 68% of the patients were discharged with continuous positive airway pressure (CPAP), 15% with Bilevel ventilation, and 17% without any ventilatory treatment [12].

The study by Silva et al. (2017) aimed to evaluate 64 patients with COPD and mild hypoxemia, who were clinically stable, regarding the prevalence of OSA and predictive variables of nocturnal hypoxemia. After evaluating and analyzing the data of individuals admitted between April and September 2013, it was possible to identify that 39 patients (61%) presented sleep-related breathing disorders, with 14 of them (21.8%) having OSA; furthermore, it was possible to identify that 25 patients (39.1%) presented isolated nocturnal hypoxemia and another 25 individuals (39.1%) did not present either of the two sleep disorders [13].

Conclusion

The studies discussed show that overlap syndrome, OSA associated with COPD, is frequent, demonstrating a correlation between both diseases in the HRQoL. It was possible to observe that there is a higher prevalence of overlap syndrome in hospitalized patients with COPD compared to individuals without the disease, and that a PRP promotes benefits in the management of overlap syndrome, providing better HRQoL, improving dyspnea, physical capacity, respiratory muscle function, exercise tolerance, and reducing AHI.

However, predictive variables such as body mass index, comorbidities, and ESS also correlate with the exacerbation and severity of COPD. Thus, despite the positive results, it is important to highlight that more studies on the subject should be conducted, as it is a relatively new discussion in science, and there are still

divergences on certain aspects, in addition to a limited number of scientific evidence on the topic.

Acknowledgements

I thank UniEVANGÉLICA and the National Council for Scientific and Technological Development for their assistance through the Scientific Initiation Scholarship Program (PBIC-CNPq).

Bibliographic References

Ministério da Saúde (Brasil). Você sabe o que é a Doença Pulmonar Obstrutiva Crônica?. 2022.

Halding AG, Aarsheim EI, Dolmen NM, Jensen AJ, Stavøstrand S, Grov EK.

Zwerink M, Brusse-Keizer M, van der Valk PD, Zielhuis GA, Monninkhof EM, vander Palen J, et al. Autogestão para pacientes com doença pulmonar obstrutiva crônica. *Cochrane Database Syst Rev*. 2014;(3):CD002990.

AV Benjafield , NT Ayas , PR Eastwood , R. Heinzer , MSM Ip , MJ Morrell , e outros. Estimativa da prevalência global e da carga da apneia obstrutiva do sono: uma análise baseada na literatura *Lancet Respir Med* , 7 (8) (2019) , pp

Quan SF, Howard BV, Iber C, Kiley JP, Nieto FJ, O'Connor GT, Rapoport DM, Redline S, Robbins J, Samet JM, Wahl PW. The Sleep Heart Health Study: design, rationale, and methods. *Sleep* 1997;20(12):1077-85.

Epstein LJ, Kristo D, Strollo PJ, et al. Clinical guideline for the evaluation, management and long-term care of obstructive sleep apnea in adults. *J Clin Sleep Med*. 2009;5(3):263-76.

Agusti A, Hedner J, Marin JM, Barbé F, Cazzola M, Rennard S. Night-time symptoms: a forgotten dimension of COPD. *Eur Respir Rev*. 2011;20(121):183-94.

Lewis CA, Fergusson W, Eaton T, Zeng I, Kolbe J. Isolated nocturnal desaturation in COPD: prevalence and impact on quality of life and sleep. *Thorax*. 2009;64(2):133-8.

Flenley DC. Sleep in chronic obstructive lung disease. *Clin Chest Med* 1985;6(4):651-61.

Shawon MS, Perret JL, Senaratna CV, Lodge C, Hamilton GS, Dharmage SC. Current evidence on prevalence and clinical outcome of co-morbid obstructive sleep apnea and chronic obstructive pulmonary disease: a systematic review. *Sleep Med Rev*. 2017;32:58–68.

Turcani P, Skrickova J, Pavlik T, Janousova E, Orban M. The prevalence of obstructive sleep apnea in patients hospitalized for COPD exacerbation. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub*. 2015;159(3):422-8.

Schreiber A, Cemmi F, Ambrosino N, Ceriana P, Lastoria C, Carlucci A. Prevalence and Predictors of Obstructive Sleep Apnea in Patients with Chronic Obstructive Pulmonary Disease Undergoing Inpatient Pulmonary Rehabilitation. *COPD*. 2018;15(3):265-270..

Silva JLR, Conde MB, Corrêa K de S, Rabahi H, Rocha AA, Rabahi MF. Sleep-disordered breathing in patients with COPD and mild hypoxemia: prevalence and predictive variables. *J bras pneumol*. 2017;43(3):176–82.