



Efficacy of exercise as a treatment for Obstructive Sleep Apnea Syndrome: A systematic review



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ABSTRACT

Introduction: Obstructive Sleep Apnea Syndrome (OSAS) is a prevalent condition associated with numerous adverse health consequences. Exercise therapy was described as a valuable OSAS treatment alternative to continuous positive airway pressure.

Objective: The objective of the present systematic review was to assess the efficacy of exercise in reducing OSAS severity and associated comorbidities.

Setting: We queried MEDLINE and SCOPUS and ScienceDirect databases with the following keywords: “sleep apnea” and “sleep disordered breathing” for the population and “physical activity”, “fitness” and “exercise” for the intervention.

Results: Eight studies including a total number of 354 patients showed that OSAS severity was significantly reduced after intervention. This reduction was associated with significant improvement in cardio-vascular fitness, sleep quality and quality of life. Conversely, this effect was not directly related to body weight reduction.

Conclusion: This systematic review suggests that physical activity should be recommended as a treatment for OSAS patients. However, further research is necessary to demonstrate this long-term efficiency with a higher level of confidence and to better understand the underlying physiological mechanisms.

1. Introduction

Obstructive Sleep Apnea Syndrome (OSAS) is a condition characterized by repetitive obstruction of the upper airway during sleep that is associated with a decrease in oronasal airflow, oxygen desaturation and arousals.¹

OSAS is a common sleep disorder. The estimated prevalence is 22% in men and 17% in women and increases progressively with age.² Obesity is considered the strongest predictor of OSAS even if smoking and alcohol consumption are also linked to the syndrome.^{2,3} OSAS is associated with a wide range of health consequences such as daytime sleepiness and cognitive impairment. Moreover, it increases cardio-vascular morbidity, inducing a higher risk of stroke, atrial fibrillation, coronary disease and congestive heart failure.⁴

Continuous positive airway pressure (CPAP) is recommended as the first-line treatment for moderate to severe OSAS.^{5–7} CPAP has been shown to decrease health comorbidities,⁷ to reduce symptoms as daytime sleepiness and snoring, and to improve cardiovascular indices.⁶ However, its long-term effectiveness is often limited by poor patient compliance related to nasal discomfort, mask leak, congestion and

claustrophobia.^{6–8}

Lifestyle interventions combining diet and exercise are efficient to reduce body weight in obese patients, inducing a subsequent decrease in OSAS severity.^{9,10} However, it was recently demonstrated that the benefit of physical activity on OSAS was not directly related to body weight reduction.^{11–13} Two meta-analyses showed the interest of exercise therapy in treating OSAS without focusing on weight loss.^{12,13} The studies were included when changes in cardiorespiratory fitness were reported,¹² or based on specific exercise program characteristics (duration ≥ 2 months, session duration ≥ 30 min and frequency ≥ 2 times a week).¹³

The aim of the present systematic review was to assess all updated evidence about the effectiveness of exercise program in reducing OSAS severity and improving subsequent comorbidities, without restrictions in terms of exercise program characteristics.

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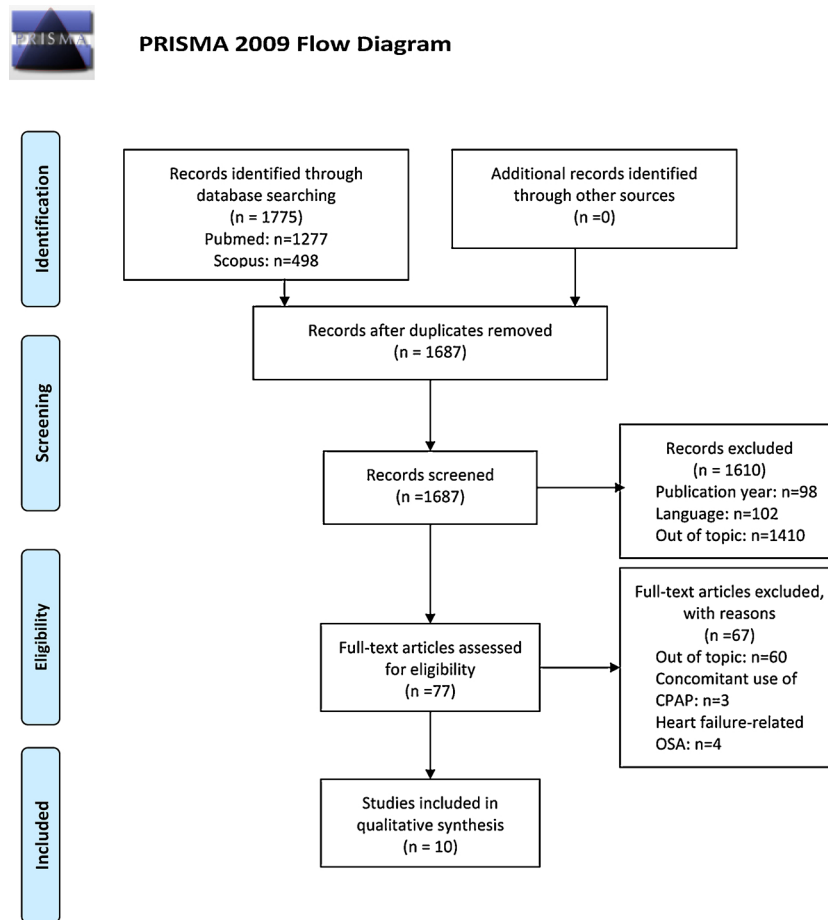


Fig. 1. Flowchart of study selection.

2. Methods

2.1. Search strategy

We adopted Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to perform this systematic review. The trial was registered in the PROSPERO database (CRD42015029443).

Studies were identified from MEDLINE, SCOPUS and ScienceDirect databases. The search terms were included in an equation based on PICO method: “sleep apnea” and “sleep disordered breathing” for the population, “physical activity”, “fitness” and “exercise” for the intervention. Neither intervention nor comparator were specified into the equation to be not too restrictive.

To be included, studies had to meet the following inclusion criteria based on the PICO method:

- Population: adult patients (≥ 18 years old) with primary OSAS (heart failure-related OSAS patients populations were excluded)
- Intervention: exercise therapy program (studies reporting additional intervention with CPAP or concomitant diet were excluded)
- Comparison: all other treatment, placebo or no comparator
- Primary or secondary outcome: reduction of Apnea-Hypopnea Index (AHI)
- Study design: randomized and nonrandomized controlled trials; uncontrolled before-and-after studies (case reports were excluded)
- Publication year: 1995-2017
- Language: English or French

2.2. Data analysis and quality assessment

Literature was independently screened and reviewed by the two authors (BB and GR). Titles and abstracts were analyzed and irrelevant papers were excluded. Full texts of potentially eligible papers were explored based on the inclusion criteria. Disagreements between authors were resolved by discussion and consensus. Bibliographic references of articles were also reviewed. Quality appraisal was conducted using the Critical Review Form – Quantitative Studies, relating to study description, internal and external validity and which evaluates the study methodology on a total score of 16.¹⁴ Severity of OSAS, measured by AHI, was defined as the primary outcome. Quantitative effects of exercise on other markers of sleep efficiency, body composition, fitness and subjective parameters were also collected in the different trials. To be included in the analysis, outcomes had to be listed in at least 2 selected studies.

3. Results

3.1. Study selection

The process of study selection is described in Fig. 1. A total of 1775 references were screened. After exclusion of duplicate studies, 1687 papers were reviewed and a total of 8 articles met the inclusion criteria.

3.2. Study characteristics

3.2.1. Design and population

Seven randomized controlled trials (RCT) and 1 controlled case-series study including a total number of 354 patients were identified

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