

Quality of Life in Patients with Pickwickian Syndrome (Obesity Hypoventilation Syndrome): A Systematic Literature Review

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Abstract

Introduction: Pickwickian Syndrome, also known as Obesity Hypoventilation Syndrome, is a chronic respiratory disorder associated with obesity that substantially affects patients' physical, psychological, and social quality of life. Although several treatment approaches are available, their effects on quality-of-life outcomes have not been comprehensively synthesized.

Objective: This study aimed to evaluate the influence of different treatment approaches on the quality of life of patients with Pickwickian Syndrome. **Method:** A systematic literature review was conducted using PubMed, EBSCOhost, and Web of Science databases. A total of 28 articles were identified and screened according to predefined eligibility criteria based on the Population, Intervention, Comparison, and Outcome framework. Following duplicate removal and full-text assessment, six studies were included in the final review. **Result and Discussion:** The findings showed that weight-loss interventions, including bariatric surgery and dietary management, improved body weight, sleep-disordered breathing, and quality of life. Rehabilitation programs combining exercise, nutritional counseling, and behavioral support enhanced functional capacity, exercise tolerance, and health-related quality of life. Positive airway pressure therapies, including continuous positive airway pressure and noninvasive ventilation, improved gas exchange, sleep quality, daytime alertness, respiratory symptoms, and overall well-being. **Conclusions:** Different treatment approaches positively affect the quality of life of patients with Pickwickian Syndrome. Weight-loss interventions target the underlying cause of the disease, rehabilitation programs improve functional and psychosocial outcomes, and positive airway pressure therapies effectively alleviate respiratory and sleep-related symptoms.

Introduction

Obesity has become one of the most significant global public health challenges due to its rapidly increasing prevalence and its association with numerous chronic diseases. The growing burden of obesity has contributed substantially to increased morbidity, mortality, and healthcare expenditures worldwide. Beyond metabolic and cardiovascular disorders, obesity also has profound effects on respiratory physiology and pulmonary function. Excess adipose tissue alters respiratory mechanics, reduces lung volumes, increases airway resistance, and promotes chronic systemic inflammation, thereby predisposing individuals to a variety of respiratory complications (Palma *et al.*, 2022). Among these complications, Obesity Hypoventilation Syndrome (OHS), historically referred to as Pickwickian Syndrome, has emerged as a particularly important clinical condition because of its increasing prevalence alongside the obesity epidemic (Masa *et al.*, 2019).

Obesity Hypoventilation Syndrome is a complex respiratory disorder characterized by obesity, chronic daytime hypercapnia, and sleep-disordered breathing in the absence of alternative causes of hypoventilation (Ramírez Molina *et al.*, 2020; Masa *et al.*, 2019). The syndrome is commonly associated with moderate to severe obstructive sleep apnea and is frequently underdiagnosed despite its serious clinical consequences (Soghier *et al.*, 2019). Epidemiological studies indicate that OHS affects a substantial proportion of obese individuals, particularly those with severe obesity, and its prevalence is expected to increase as obesity rates continue to rise globally (Masa *et al.*, 2019). The condition is associated with multiple comorbidities, including cardiovascular disease, pulmonary hypertension, metabolic disorders, and chronic respiratory failure, all of which contribute to adverse clinical outcomes (Afshar *et al.*, 2020). Patients with OHS often experience recurrent hospitalizations and elevated healthcare utilization compared with individuals suffering from obstructive sleep apnea alone (Ramírez Molina *et al.*, 2020).

The burden of OHS extends beyond physiological impairment and significantly affects patients' quality of life. Individuals with OHS frequently experience excessive daytime sleepiness, fatigue, reduced exercise tolerance, impaired cognitive performance, and limitations in social participation. Respiratory symptoms such as dyspnea and sleep disturbances may restrict daily activities and reduce overall functional independence. Patients often require long-term respiratory support, including home mechanical ventilation or positive airway pressure therapy, which may further influence physical, psychological, and social well-being (D'Cruz *et al.*, 2023). Previous research has demonstrated that respiratory symptoms and dependence on ventilatory support are strongly associated with reduced health-related quality of life among patients receiving long-term respiratory care (Kleiven *et al.*, 2022).

Quality of Life (QoL) refers to an individual's overall perception of their position in life within their culture, value systems, goals, expectations, and concerns, encompassing physical, psychological, social, and environmental dimensions (Veenhoven, 2024). Health-Related Quality of Life (HRQoL) specifically focuses on the impact of health conditions and medical interventions on an individual's physical functioning, psychological well-being, social relationships, and daily activities (Saketkoo *et al.*, 2021). HRQoL has become an important patient-centered outcome in chronic diseases because it reflects not only clinical status but also the extent to which a disease affects patients' overall well-being and functional independence (Iyer, 2025).

Several therapeutic approaches have been proposed to improve both clinical outcomes and quality of life in patients with OHS. Positive airway pressure therapies,

including continuous positive airway pressure (CPAP) and noninvasive ventilation (NIV), represent the cornerstone of treatment and have demonstrated benefits in improving gas exchange, sleep quality, and symptom control (Afshar *et al.*, 2020; Arellano-Maric *et al.*, 2020; Soghier *et al.*, 2019). Weight reduction strategies, including lifestyle modifications and bariatric surgery, are also considered fundamental components of management because they target the underlying cause of the syndrome and may substantially improve respiratory function and disease severity (Ramírez Molina *et al.*, 2020). In addition, nutritional interventions, rehabilitation programs, and structured exercise training have shown promising effects on functional capacity, body composition, sleep quality, and health-related quality of life (Elbanna *et al.*, 2023). Exercise-based interventions have also been associated with improvements in obstructive sleep apnea severity and cardiopulmonary fitness, which may indirectly enhance quality of life outcomes (Lin *et al.*, 2020).

Despite the growing body of literature addressing the diagnosis and management of Obesity Hypoventilation Syndrome (OHS), evidence regarding the influence of different treatment approaches on patients' quality of life remains fragmented across various studies. Most previous research has focused on physiological and clinical outcomes, including gas exchange, respiratory function, sleep parameters, and cardiovascular complications, while the impact of treatment on health-related quality of life has received comparatively less attention. Since OHS is a chronic condition that affects physical, psychological, and social functioning, evaluating quality of life is essential for determining the overall effectiveness of therapeutic interventions. Understanding how different management strategies influence patient well-being may assist healthcare professionals in selecting the most appropriate and patient-centered treatment options. Therefore, this systematic literature review aims to synthesize and critically evaluate existing evidence to answer the research question "How do different treatment approaches affect the quality of life of patients with Pickwickian Syndrome (Obesity Hypoventilation Syndrome)?"

Method

This study employed a Systematic Literature Review (SLR) design to synthesize existing evidence regarding the impact of different treatment approaches on the quality of life of patients with Pickwickian Syndrome, also known as Obesity Hypoventilation Syndrome (OHS). The review was conducted by systematically identifying, screening, and analyzing relevant studies published in peer-reviewed scientific journals. The literature search was performed using three electronic databases: PubMed, EBSCOhost, and Web of Science. These databases were selected because they provide comprehensive coverage of biomedical, respiratory, rehabilitation, and public health research. The search strategy combined keywords and controlled vocabulary related to Obesity Hypoventilation Syndrome, rehabilitation interventions, and quality of life outcomes. Searches were limited to studies published in English between January 2014 and January 2024 to ensure the inclusion of contemporary evidence reflecting current clinical practice.

For the PubMed database, Medical Subject Headings (MeSH) and Title/Abstract terms were used. Search terms included "Obesity Hypoventilation Syndrome," "Hypoventilation Syndrome, Obesity," "Obesity-Hypoventilation Syndrome," and "Pickwickian Syndrome," combined with terms related to rehabilitation and functional recovery, including "Rehabilitation," "Recovery of Function," "Early Intervention," and "Disability Evaluation." These terms were further combined with quality-of-life-related

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keywords such as “Quality of Life,” “Health Related Quality of Life,” “Health-Related Quality of Life,” “Life Quality,” and “HRQoL.” Similar keyword combinations were adapted for EBSCOhost and Web of Science using Boolean operators to maximize search sensitivity and specificity.

The inclusion criteria consisted of full-text articles published in English between 2014 and 2024, including original research articles, systematic reviews, and meta-analyses that examined treatment interventions and quality-of-life outcomes among patients with OHS. Studies were excluded if they were narrative literature reviews, editorials, conference abstracts, case reports, or did not correspond to the predefined Population, Intervention, Comparison, and Outcome (PICO) framework. All identified records were screened based on title, abstract, and full-text assessment to determine their eligibility for inclusion.

A total of 28 records were initially identified through database searching, comprising 5 articles from PubMed, 9 from EBSCOhost, and 14 from Web of Science. After removing duplicate records (n = 4), the remaining studies were screened for relevance. The screening process involved evaluation of titles, abstracts, and full texts according to the established eligibility criteria. Following the selection process, six studies were deemed relevant and were included in the final qualitative synthesis. These studies formed the basis for evaluating the relationship between treatment modalities and quality-of-life outcomes in patients with Pickwickian Syndrome.

Table 1
Search Strategy

| Database | Search Strategy | Filters Applied | Results (n) |
|----------------|--|---|-------------|
| PubMed | ((Obesity Hypoventilation Syndrome) OR (Hypoventilation Syndrome, Obesity) OR (Obesity-Hypoventilation Syndrome) OR (Pickwickian Syndrome)) AND ((Rehabilitation) OR (Recovery of Function) OR (Early Intervention) OR (Disability Evaluation)) AND ((Quality of Life) OR (Health Related Quality of Life) OR (Health-Related Quality of Life) OR (Life Quality) OR (HRQoL)) | Free full text; English language | 5 |
| EBSCOhost | (Obesity Hypoventilation Syndrome OR Pickwickian Syndrome) AND (Rehabilitation OR Early Intervention) AND (Health Related Quality of Life OR Health-Related Quality of Life) | Full text; English language; Publication date January 2014-January 2024; Abstract available | 9 |
| Web of Science | (Obesity Hypoventilation Syndrome OR Pickwickian Syndrome) AND (Rehabilitation OR Early Intervention) AND (Health Related Quality of Life OR Health-Related Quality of Life) | English language; Publication date January 2014-January 2024 | 14 |
| Total | | | 28 |

Table 2
 Eligibility Criteria Based on PICO Framework

| Component | Criteria |
|------------------|---|
| Population (P) | Patients diagnosed with Pickwickian Syndrome or Obesity Hypoventilation Syndrome (OHS) |
| Intervention (I) | Treatment approaches including positive airway pressure therapy, noninvasive ventilation, weight-loss interventions, rehabilitation programs, exercise training, dietary interventions, and bariatric surgery |
| Comparison (C) | Standard care, lifestyle modification, alternative interventions, or no intervention |
| Outcome (O) | Health-related quality of life (HRQoL), functional capacity, sleep quality, symptom improvement, and patient-reported outcomes |

Table 3
 Study Selection Process

| Screening Stage | Number of Studies |
|---|-------------------|
| Records identified through database searching | 28 |
| PubMed | 5 |
| EBSCOhost | 9 |
| Web of Science | 14 |
| Duplicate records removed | 4 |
| Records screened | 24 |
| Full-text articles assessed for eligibility | 24 |
| Studies included in the final review | 6 |

Result and Discussion

A total of 28 records were identified through database searching, consisting of 5 articles from PubMed, 9 from EBSCOhost, and 14 from Web of Science. The screening process was independently conducted by two reviewers, namely the author and supervisor, using the Artificial Intelligence-assisted platform Rayyan.ai. Screening involved title, abstract, and full-text evaluation according to predefined eligibility criteria. Disagreements between reviewers were resolved through consensus discussions. Following duplicate removal and eligibility assessment, six studies were included in the final review. These studies examined three major treatment approaches for Obesity Hypoventilation Syndrome (OHS) which are weight-loss interventions, rehabilitation programs, and positive airway pressure (PAP) therapies.

Table 4
 Finding Studies

| Study | Study Design | Treatment Approach | Main Findings |
|-------------------------------|-----------------------------|--|--|
| Shaarawy <i>et al.</i> (2016) | Original article | Sleeve gastrectomy in OHS patients with poor CPAP response | Significant reductions in body weight, BMI, AHI, and CPAP pressure requirements after 12 months, indicating substantial clinical improvement and potential enhancement of quality of life (Shaarawy <i>et al.</i> , 2016). |
| Mandal <i>et al.</i> (2018) | Randomized controlled trial | NIV plus rehabilitation versus NIV alone | Greater weight loss, improved exercise capacity, and significantly better SF- |

| | | | |
|-------------------------------------|-------------------------------------|-----------------------------|--|
| Afshar <i>et al.</i> (2020) | Systematic review and meta-analysis | PAP therapy (CPAP and NIV) | 36 general health scores in the rehabilitation group (Mandal <i>et al.</i> , 2018). PAP therapy improved gas exchange, daytime sleepiness, sleep quality, quality of life, emergency department visits, and mortality outcomes (Afshar <i>et al.</i> , 2020). Both modalities improved sleep quality, gas exchange, dyspnea, daytime sleepiness, and quality of life, with no major differences between treatments (Soghier <i>et al.</i> , 2019). |
| Soghier <i>et al.</i> (2019) | Systematic review | CPAP versus NIV | Health-related quality of life was strongly influenced by dyspnea severity and frequency of hospital admissions (López-Campos <i>et al.</i> , 2008). Most patients maintained adequate daytime PaCO ₂ levels with no deterioration in quality of life, sleep parameters, or pulmonary function (Arellano-Maric <i>et al.</i> , 2020). |
| López-Campos <i>et al.</i> (2008) | Original article | Home mechanical ventilation | |
| Arellano-Maric <i>et al.</i> (2020) | Original article | Switching from NIV to CPAP | |

Weight-Loss Interventions

Weight reduction represents one of the most important therapeutic targets in OHS because obesity is the fundamental underlying factor contributing to respiratory dysfunction and sleep-disordered breathing. Excess adipose tissue impairs respiratory mechanics, reduces lung volumes, and increases the risk of chronic hypoventilation and obstructive sleep apnea (Palma *et al.*, 2022). Consequently, interventions aimed at reducing body weight are expected to improve both physiological outcomes and health-related quality of life. Current evidence indicates that substantial weight loss can reduce the severity of sleep-disordered breathing, improve gas exchange, decrease daytime sleepiness, and enhance overall functional status (Ramírez Molina *et al.*, 2020).

The strongest evidence regarding weight-loss interventions was provided by the bariatric surgery study conducted by Shaarawy *et al.* (2016). After 12 months of follow-up, patients demonstrated significant reductions in body weight, BMI, apnea-hypopnea index (AHI), and CPAP pressure requirements. Two participants achieved complete remission of obstructive sleep apnea, while the remaining patients experienced marked reductions in disease severity (Shaarawy *et al.*, 2016). These findings are consistent with broader evidence indicating that bariatric surgery can produce weight reductions of 15-64%, reduce OSA severity by 18-44%, and improve daytime hypercapnia and pulmonary hemodynamics (Ramírez Molina *et al.*, 2020). Improvements in these clinical parameters are likely to translate into better physical functioning, reduced symptom burden, and enhanced quality of life.

Recent evidence also suggests that dietary interventions contribute to quality-of-life improvements among OHS patients. Fasting-mimicking diets and calorie-restriction strategies have been associated with improvements in body weight, sleep quality, and overall well-being (Elbanna *et al.*, 2023). Since sleep quality is closely linked to physical and mental health, successful weight reduction may indirectly improve multiple dimensions of quality of life. Therefore, weight-loss interventions should be considered a foundational component of OHS management because they address both disease severity and patient-centered outcomes.

Rehabilitation Programs

The reviewed evidence shows that rehabilitation programs provide significant benefits beyond standard respiratory support. Rehabilitation approaches typically combine nutritional counseling, exercise training, behavioral modification, and patient education to address the multifactorial challenges experienced by individuals with OHS. These interventions target physical deconditioning, obesity, reduced exercise tolerance, and psychosocial limitations that commonly impair quality of life. The randomized controlled trial conducted by Mandal *et al.* (2018) showed that patients receiving rehabilitation in addition to noninvasive ventilation achieved greater weight loss, improved exercise capacity, and significantly better quality-of-life outcomes than those receiving NIV alone. Improvements were observed in six-minute walk distance, functional capacity, breathlessness scores, and SF-36 general health domains (Mandal *et al.*, 2018). These findings suggest that rehabilitation can address limitations not fully corrected by ventilatory support alone.

The beneficial effects of rehabilitation are supported by evidence from studies involving patients with obstructive sleep apnea, a condition present in approximately 90% of OHS patients (Masa *et al.*, 2019). Exercise interventions have been shown to improve respiratory muscle performance, upper airway stability, aerobic fitness, and sleep quality. A systematic review and meta-analysis found that exercise training significantly reduced AHI while improving cardiorespiratory fitness and sleep-related outcomes (Mendelson *et al.*, 2018). Similarly, comprehensive physical therapy programs improved sleep parameters, oxygen saturation, and OSA severity (Lin *et al.*, 2020), while regular aerobic exercise reduced BMI, AHI, oxygen desaturation, and cardiovascular stress markers (Yang *et al.*, 2018). Collectively, these findings suggest that rehabilitation programs have considerable potential to improve quality of life through both physiological and functional mechanisms.

Positive Airway Pressure Therapy

Positive airway pressure therapy remains the cornerstone treatment for OHS because it directly addresses sleep-disordered breathing and chronic hypoventilation. Both continuous positive airway pressure (CPAP) and noninvasive ventilation (NIV) have demonstrated effectiveness in improving respiratory outcomes and patient-reported quality of life. By stabilizing the upper airway and improving nocturnal ventilation, PAP therapy reduces daytime hypercapnia, improves oxygenation, and alleviates symptoms such as excessive daytime sleepiness and fatigue (Afshar *et al.*, 2020).

The systematic review and meta-analysis conducted by Afshar *et al.* (2020) found that PAP therapy was associated with improved gas exchange, sleep quality, daytime alertness, quality of life, and reduced emergency department utilization. Importantly, PAP therapy also contributed to improved survival outcomes, highlighting its substantial

clinical value (Afshar *et al.*, 2020). Similarly, Soghier *et al.* (2019) reported that both CPAP and NIV effectively improved gas exchange, reduced oxygen dependency, alleviated dyspnea, and enhanced quality of life. No major differences were observed between the two modalities regarding mortality, cardiovascular outcomes, or overall quality-of-life improvements (Soghier *et al.*, 2019).

An important practical consideration is the selection between CPAP and NIV. The evidence suggests that CPAP may be sufficient for most patients with OHS and severe obstructive sleep apnea, whereas NIV may be more appropriate for patients with advanced respiratory impairment, poor pulmonary function, or persistent hypoventilation (Masa *et al.*, 2019; Soghier *et al.*, 2019). Supporting this perspective, Arellano-Maric *et al.* (2020) demonstrated that patients successfully transitioned from NIV to CPAP without experiencing deterioration in quality of life, sleep outcomes, or pulmonary function. Because CPAP is generally less expensive and easier to implement than NIV, this finding has important implications for healthcare resource utilization and long-term treatment adherence.

The findings of López-Campos *et al.* (2008) emphasize that quality of life in OHS is strongly influenced by symptom burden rather than respiratory parameters alone. Dyspnea severity and hospital admission frequency were identified as the most significant predictors of impaired health-related quality of life. Patients often face challenges associated with dependence on respiratory devices, prolonged ventilation requirements, reduced work capacity, and limitations in daily activities (López-Campos *et al.*, 2008). Consequently, successful treatment should not only focus on improving physiological indicators but also address functional independence and psychosocial well-being.

The evidence suggests that different treatment modalities positively influence quality of life among patients with Pickwickian Syndrome. Weight-loss interventions address the underlying cause of the disease, rehabilitation programs improve functional capacity and patient well-being, and PAP therapies effectively alleviate respiratory symptoms and sleep disturbances. Among these approaches, a multidisciplinary strategy combining weight management, rehabilitation, and PAP therapy appears to offer the most comprehensive improvement in quality-of-life outcomes for patients with OHS (Ramírez Molina *et al.*, 2020; Masa *et al.*, 2019; Afshar *et al.*, 2020).

Conclusion

OHS is a complex obesity-related respiratory disorder associated with substantial physical, psychological, and social impairments resulting from chronic hypoventilation, obstructive sleep apnea, reduced functional capacity, and multiple cardiometabolic comorbidities. The reviewed evidence shows that weight-loss interventions, particularly bariatric surgery and structured dietary programs, can improve respiratory function, reduce disease severity, and enhance overall well-being. Rehabilitation programs that combine exercise training, nutritional management, and behavioral support contribute to improvements in functional capacity, physical performance, and health-related quality of life. Positive airway pressure therapies, including both CPAP and NIV, effectively improve gas exchange, sleep quality, daytime symptoms, and patient-reported quality-of-life outcomes, with CPAP generally preferred for patients with severe OSA and NIV reserved for selected patients with persistent hypoventilation or more severe respiratory impairment.

Reference

- Afshar, M., Brozek, J. L., Soghier, I., Davis, G., Channick, R., Masa, J. F., Mokhlesi, B., Murphy, P. B., Piper, A. J., Tulaimat, A., & Patel, S. R. (2020). [The role of positive airway pressure therapy in adults with obesity hypoventilation syndrome: A systematic review and meta-analysis](https://doi.org/10.1513/AnnalsATS.201907-528OC). *Annals of the American Thoracic Society*, 17(3), 344-360. <https://doi.org/10.1513/AnnalsATS.201907-528OC>
- Arellano-Maric, M. P., Hamm, C., Duiverman, M. L., Castro-Añón, O., González-Bermejo, J., Ambrosino, N., Escarrabill, J., Gómez de Terreros, F. J., Masa, J. F., & Murphy, P. B. (2020). [Obesity hypoventilation syndrome treated with non-invasive ventilation: Is a switch to CPAP therapy feasible?](https://doi.org/10.1111/resp.13704) *Respirology*, 25(4), 435-442. <https://doi.org/10.1111/resp.13704>
- D'Cruz, R. F., Kaltsakas, G., Suh, E. S., & Hart, N. (2023). [Quality of life in patients with chronic respiratory failure on home mechanical ventilation](https://doi.org/10.1183/16000617.0237-2022). *European Respiratory Review*, 32(168). <https://doi.org/10.1183/16000617.0237-2022>
- Elbanna, R. H. M., Elabd, S. O. A., & Alghitany, S. I. A. (2023). [Comparing the influence of foot reflexology and fasting mimicking diet on quality of life and sleep quality in obesity hypoventilation syndrome](https://doi.org/10.1515/jcim-2022-0172). *Journal of Complementary and Integrative Medicine*, 20(1), 207-213. <https://doi.org/10.1515/jcim-2022-0172>
- Iyer, M. (2025). [Health Status and Quality of Life Among Individuals with Chronic Health Conditions](https://doi.org/10.1515/bjhs-2025-0017). *Believers Journal of Health Sciences*, 1(3), 1-7.
- Kleiven, A. L., Markussen, H. Ø., Skjøsberg, O. H., Janssens, J. P., & Aarrestad, S. (2022). [Effect of respiratory events on health-related quality of life in patients treated with long-term noninvasive ventilation](https://doi.org/10.1159/000527066). *Respiration*, 101(12), 1099-1109. <https://doi.org/10.1159/000527066>
- Lin, H. Y., Chang, C. J., Chiang, C. C., Su, P. L., Lin, C. Y., & Hung, C. H. (2020). [Effects of a comprehensive physical therapy on moderate and severe obstructive sleep apnea: A preliminary randomized controlled trial](https://doi.org/10.1016/j.jfma.2020.01.011). *Journal of the Formosan Medical Association*, 119(12), 1781-1790. <https://doi.org/10.1016/j.jfma.2020.01.011>
- López-Campos, J. L., Failde, I., Masa, J. F., Benítez-Moya, J. M., Barrot, E., Ayerbe, R., & León, A. (2008). [Factors related to quality of life in patients receiving home mechanical ventilation](https://doi.org/10.1016/j.rmed.2007.11.005). *Respiratory Medicine*, 102(4), 605-612. <https://doi.org/10.1016/j.rmed.2007.11.005>
- Mandal, S., Suh, E. S., Harding, R., Ramsay, M., Kamalanathan, M., Henderson, K., Barker, R., Murphy, P. B., & Hart, N. (2018). [Nutrition and exercise rehabilitation in obesity hypoventilation syndrome \(NERO\): A pilot randomised controlled trial](https://doi.org/10.1136/thoraxjnl-2016-209826). *Thorax*, 73(1), 62-69. <https://doi.org/10.1136/thoraxjnl-2016-209826>
- Masa, J. F., Pépin, J. L., Borel, J. C., Mokhlesi, B., Murphy, P. B., & Sánchez-Quiroga, M. Á. (2019). [Obesity hypoventilation syndrome](https://doi.org/10.1183/16000617.0097-2018). *European Respiratory Review*, 28(151), Article 180097. <https://doi.org/10.1183/16000617.0097-2018>
- Mendelson, M., Bailly, S., Marillier, M., Flore, P., Borel, J. C., Vivodtzev, I., Tamisier, R., Pépin, J. L., & Verges, S. (2018). [Obstructive sleep apnea syndrome, objectively measured physical activity and exercise training interventions: A systematic review and meta-analysis](https://doi.org/10.3389/fneur.2018.00073). *Frontiers in Neurology*, 9, Article 73. <https://doi.org/10.3389/fneur.2018.00073>

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- Palma, G., Sorice, G. P., Genchi, V. A., Giordano, F., Caccioppoli, C., D'Oria, R., ... & Perrini, S. (2022). [Adipose tissue inflammation and pulmonary dysfunction in obesity. *International journal of molecular sciences*, 23\(13\), 7349.](https://doi.org/10.3390/ijms23137349)
- Ramírez Molina, V. R., Masa Jiménez, J. F., Gómez de Terreros Caro, F. J., & Corral Peñafiel, J. (2020). [Effectiveness of different treatments in obesity hypoventilation syndrome. *Pulmonology*, 26\(6\), 370-377.](https://doi.org/10.1016/j.pulmoe.2020.05.012)
- Saketkoo, L. A., Russell, A. M., Jensen, K., Mandizha, J., Tavee, J., Newton, J., ... & Drent, M. (2021). [Health-related quality of life \(HRQoL\) in sarcoidosis: diagnosis, management, and health outcomes. *Diagnostics*, 11\(6\), 1089.](https://doi.org/10.3390/diagnostics11061089)
- Shaarawy, H., Sarhan, A., & El Hawary, A. (2016). Assessment of the effect of bariatric surgery on severe obstructive sleep apnea patients not tolerating CPAP therapy. *Egyptian Journal of Chest Diseases and Tuberculosis*, 65(3), 661-666. <https://doi.org/10.1016/j.ejcdt.2016.04.007>
- Soghier, I., Brožek, J. L., Afshar, M., Davis, G., Channick, R., Masa, J. F., Mokhlesi, B., Murphy, P. B., Piper, A. J., Tulaimat, A., & Patel, S. R. (2019). Noninvasive ventilation versus CPAP as initial treatment of obesity hypoventilation syndrome. *Annals of the American Thoracic Society*, 16(10), 1295-1303. <https://doi.org/10.1513/AnnalsATS.201905-380OC>
- Veenhoven, R. (2024). [Quality of life \(QOL\), an overview. *Encyclopedia of quality of life and well-being research*, 5668-5671.](https://doi.org/10.1007/978-3-031-17299-1_2353)
- Yang, H., Liu, Y., Zheng, H., Liu, G., & Mei, A. (2018). Effects of 12 weeks of regular aerobic exercises on autonomic nervous system in obstructive sleep apnea syndrome patients. *Sleep and Breathing*, 22(4), 1189-1195. <https://doi.org/10.1007/s11325-018-1736-1>